NATURE MAGAZINE

APRIL 1933 35¢ VOL. 21, NO. 4

House Wren—Ohio State Bird

Birds of the States

HOW, WHEN AND WHY THEY WERE CHOSEN AS OFFICIAL EMBLEMS

A 16-page booklet, size 8½ x 11½ inches, presenting 30 full color paintings (2½ x 3½ inches) of all the State birds thus far selected

Paintings by R. BRUCE HORSFALL, *Art Director of Nature Magazine*

[Detailed correlative text characteristic of each bird]

Descriptive Text by CARRA E. HORSFALL

Also a complete list of the State flowers. An illustrated article on the birds and the method of their selection stating legislation under which each was adopted.

By KATHERINE B. TIPPETTS, *Chairman, Division of Conservation, General Federation of Women's Clubs*

50 cents per copy

25c per copy (Ten or more copies to one address)

The cost of the booklets is governed by the high cost of color printing and the expense of mailing. Orders for less than ten copies must be charged for at fifty cents a copy; for more than ten at twenty-five cents a copy.

Write to
AMERICAN NATURE ASSOCIATION
1214 Sixteenth Street
Washington, D.C.

Raccoon

Bird and Animal Paintings

BY R. BRUCE HORSFALL

Cloth Bound : Lettered in Gold

Only $1.50

This beautifully printed book, page size 8½" x 11", contains 168 pictures of Birds, Animals, Insects and Butterflies, in full colors,—size 2½" x 3½", and an attractive frontispiece of the American Eagle.

Each picture is accompanied by concise description of the character and habits of the subject.

Helpful suggestions are included to show the use of the book for school, camp, home and other educational purposes.

Despite the high cost of color plates and printing all this will cost the readers of Nature Magazine only $1.50 a copy.

Write to
AMERICAN NATURE ASSOCIATION
1214 Sixteenth Street
Washington, D.C.

NATURE IN PRINT

As a convenience to readers to om book stores are not easily ac- sible the books reviewed in this partment of Nature Magazine may ordered through our own book partment.

Through a Microscope

There is an unseen world about which st of us know nothing. It is a world of less variety and fascination, but it is een because it is so tiny that the human unaided, cannot penetrate its secrets. s is a task which the microscope per- ms. And what a new world this instru- nt reveals! No book could begin to cover unlimited field for microscopic study observation, but *Seeing the Unseen* by ert Disraeli takes one beyond the thresh- and stimulates one to wander on and in the fascination of this unseen world. ustrated with microphotographs, this ume outlines in thoroughly popular terms various directions in which one may vel. With its stimulation the new micro- pist will inevitably go on of his own mentum. The book is published by the n Day Company, which has given it table typographical treatment, and sells two dollars.

For Toy Dog Owners

Here is a book which is, we suspect, ch needed. Its title is *Toy Dogs, Their story, Care and Management.* Its author Josephine Z. Rine, canine authority. She ats with such species of dogs as the ihuahuas, English Toy Spaniels, Griffons, lian Greyhounds, Japanese Spaniels, ltese, Mexican Hairless, Papillons, Pek- ese, Miniature Pinschers, Pomeranians, gs, Toy Black and Tan Terriers, Toy odles and Yorkshires. We didn't know re were so many of these toys; in fact, had never heard of some of them. Should suddenly acquire one we would rush dly to this book and learn how to do our st by our pet. This book is based on perience, the practical results of years breeder, judge and dog show devotee. e author knows what she is writing about d writes for the layman. The publishers the Orange Judd Publishing Company d the book sells for two dollars.

Zoos and So Forth

Under the title *Zoological Parks, Aquari- s and Botanical Gardens,* Mr. L. C. erard, editor of the American Association Museums, has compiled valuable and herto uncollected information about the titutions mentioned in the title of the chure. Classifying these geographically, . Everard has included information on date of establishment, ownership, physi- properties, annual budget, admission arges, staff and executive personnel. An habetical index is also provided. The oklet sells for one dollar and is available m the American Association of Museums, ithsonian Institution, Washington, D. C.

FOR THE PERFECT
CANADIAN ROCKIES' VACATION

JASPER PARK

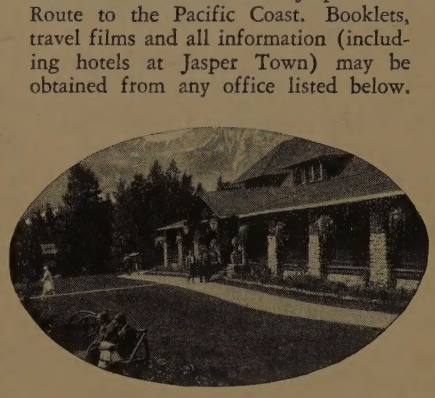
MALIGNE LAKE—*the jewel of the Canadian Rockies—is unrivalled both for its scenery and its fishing! Now just a few hours from Jasper Park Lodge.*

THIS summer vacation at Jasper Park in the very heart of the most thrilling mountains on this continent.

Fish at Maligne Lake whose sheer beauty defies description — and whose waters offer the finest brook trout on the American continent! . . . Drive to Mt. Edith Cavell with its dazzling Angel Glacier; to Pyramid Mountain; Maligne Canyon — and along the Pocahontas Highway where mountain goats and sheep often pose for their pictures . . . Follow trails that lead to jewelled lakes and snow-capped peaks. Take the saddle trips to Athabaska Falls and the Tonquin Valley . . .

Make Jasper Park Lodge your headquarters for this perfect Canadian Rockies vacation. Golf on its championship course. Swim in the warmed outdoor pool. Enjoy the informal luxury of the main lodge, or the privacy of your own perfectly appointed bungalow.

Low round trip fares permit a wide diversity of routes and stopovers. Unexcelled service on the Continental Limited that follows the Jasper Park Route to the Pacific Coast. Booklets, travel films and all information (including hotels at Jasper Town) may be obtained from any office listed below.

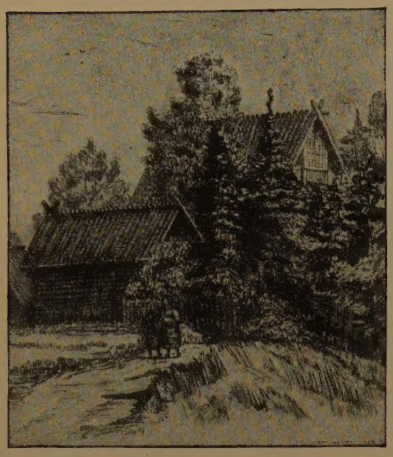


JASPER PARK LODGE: *Rates from $7.00 a day, Canadian funds, for room and meals (10% discount for two weeks or more). Season June 1-September 23. Totem Pole Golf Tournament, September 2-9. Every vacation sport.*

CANADIAN NATIONAL
To Everywhere in Canada

BOSTON 186 Tremont St.	DETROIT 1523 Washington Blvd	MINNEAPOLIS 634 Marquette Ave.	PORTLAND, ME. Grand Trunk Ry. Sta.	SEATTLE 1329 Fourth Ave.
BUFFALO 420 Main St.	DULUTH 428 W. Superior St.	NEW YORK 673 Fifth Avenue	ST. LOUIS 314 No. Broadway	WASHINGTON, D.C. 15th & H Sts. N.W.
CHICAGO 4 So. Michigan Blvd.	KANSAS CITY 705 Walnut St.	PHILADELPHIA 1422 Chestnut St.	ST. PAUL 83 East Fifth St.	LONDON, ENG. 17-19 Cockspur St.
CINCINNATI 49 E. Fourth St.	LOS ANGELES 607 So. Grand Ave.	PITTSBURGH 355 Fifth Ave.	SAN FRANCISCO 648 Market St.	PARIS, FRANCE 1 rue Scribe

SWEDEN



Zorn's House at Mora

(From an etching by Caroline Armington)

A BOLD Theodore Roosevelt of color was Anders Zorn. His paintings and etchings are scattered all over the world—but to see the best of them you have to go to Sweden. And if you love color, and would like to know first-hand what inspired Zorn, you must visit his native province—the romantic and colorful Dalecarlia.

It is a short day's ride from Stockholm. On the way you will see many historic spots. The lovely white birch groves, the fresh verdure, and the red and white little houses will make you feel as though you were riding through the illustrated pages of a story book.

To refresh your spirit and invite your soul, to say nothing of coddling your palate, come to Sweden this summer. Due to the favorable exchange rate, your dollar goes farther in Sweden this year.

And remember — Sweden is the gateway to all of the fascinating Baltic region.

Eight days direct from New York by the Swedish American Line. From London or Paris by convenient boat or train service—seven hours by air. Through trains from Berlin or Hamburg. Booklets free from any travel bureau, or write

SWEDISH STATE RAILWAYS

Travel Information Bureau **Dept. N2**
551 Fifth Avenue **New York City**

North Carolina Flora

The Natural Gardens of North Carolina is a book for which there is a present need and for which there will inevitably be an increasing demand. We can look forward, in the not too far distant future, to the time when the Great Smokies will, as a National Park, become a goal of more and more lovers of the outdoors. Then this book will be much in demand. It is the work of Dr. B. W. Wells, Professor of Botany at the University of North Carolina. In his treatment of his subject he has chosen to discuss the plants of the region in relation to their environment, an interesting and much more effective approach than is found in the usual plant guides. Dr. Wells has devoted the first part of his volume to consideration of the flora found in the eleven major plant communities of North Carolina. This, naturally, results in drawing an interesting geographical picture of the state and in indicating its unique range from sea islands to mountain peaks. The last part of the book is given over to an originally devised key based on habitat. Dr. Wells has made a real contribution to botanical literature about a region rich with opportunity for such contribution. The book is published by the University of North Carolina Press at Chapel Hill and sells for $3.50.

Gardens of Iowa

For the third successive year the Federated Garden Clubs of Iowa have brought out an annual yearbook with the title *Iowa Garden,* and each year it seems better. We do not know how generally this practice is followed by other state-wide garden club organizations, but certainly Iowa has set an example in accomplishment. The booklet, which comprises 104 pages, is a report of state activities during the year; a concise summary of local garden club activities; and a collection of valuable information of special interest to those who garden in Iowa. One interesting feature is the inclusion of brief notes from a large number of members giving to the other members the benefit of specific experiences and observations. We were particularly interested in the section devoted to the work of the committee on billboards and conservation. Reading that the members of these various clubs favor products not advertised on the landscape, and that they are equipped with a "white list" listing firms which *do* have a regard for the landscape, takes on dramatic significance as an economic factor when one also reads the imposing list of eighty member clubs. We wonder whether national advertisers realize how many people they are offending by continuing to exploit their wares against a background of rural landscape?

No Free Trees

Despite repeated attempts to establish the fact that it does not have free trees available for planting on farms, parkings, roadsides and in front yards, the United States Forest Service annually receives enough letters requesting trees to fill several mailbags. It is pointed out that the Forest Service maintains nurseries but these are exclusively to produce young trees for reforestation of National Forest areas. This supply is inadequate enough as it is, and there is no surplus available for public distribution or sale.

"When do we eat?"

● Ride trail this summer in Glacier National Park. See the land-of-shining-mountains from the top-deck of a trail-wise pony. The cost? You'll be amazed at how little. Glacier Park has everything—comfortable hotels, breathless peaks and Alpine lakes, hundreds of trails, guides that can cook, spin yarns and philosophize. On the Great Northern main line.

Glacier Park

on the route of the
Empire Builder

Write A. J. Dickinson, P. T. M., 740 Great Northern Railway Bldg., St. Paul, for particulars.

GREAT NORTHERN

NATURE STUDENTS

no matter where they travel, need not fear one type of human nature—the thief—if instead of cash, they equip themselves in advance with

AMERICAN EXPRESS TRAVELERS CHEQUES

For sale at banks and Express offices

Bird-Lore Magazine

tells all about birds

Official organ of the National Audubon Societies

Tells how to study birds, to make nesting boxes, feeding-stands and baths. Many illustrations, with color plate in every issue. $1.50 per year in U. S., $1.75 in Canada (6 issues). Descriptive circular free. Specimen magazine sent for 10 cents in stamps.

BIRD-LORE MAGAZINE

Box 687-4 **Harrisburg, Penna.**

We hardly know where to begin . . .

It's so easy this year to break away from the monotony of doing the same things, the same way, in the same places, day after day.

There are so many perfectly glorious spots in the great open spaces out West, where everything is new, sparkling, invigorating and inspiring.

And the costs! Rail fares lowest in history. Hotel rates, the price of meals, sightseeing and entertainment costs, everything has been reduced drastically.

There are so many things we want you to know about . . . how much you can do for so little expense on your vacation this summer, we hardly know where to begin.

So, we're inviting you to look over this unusual list of the West's most fascinating vacation playgrounds:

Zion - Bryce - Grand Canyon
Yellowstone - Grand Teton
Rocky Mountain National Parks, Colorado
California and Hawaii
Pacific Northwest and Alaska
Western Dude Ranches
Hoover Dam

Simply select those regions in which you are particularly interested and we will welcome the opportunity to tell you all about them.

And, if you prefer our "cut-to-cost" service in All-Expense Tour vacations, just mention it in your request.

THE OVERLAND ROUTE
UNION PACIFIC

W. S. Basinger, P. T. M., Room 407, Union Pacific Railroad, Omaha, Nebr.

Please send complete information about

.....

Name.....

Street.....

City.....State.....

☐ *I am interested in an All-Expense Escorted Tour to*.....

For Boy Scouts

In order to provide members of the Boy Scouts with adequate and easily available information which will aid them in meeting the troublesome requirement included in the examination for Merit Badge in Bird Study which asks: "Produce a list from personal reading of ten birds of prey particularly useful in the destruction of rodents", George E. Hix has produced a booklet. The title is *The Birds of Prey.* We are happy to observe that he does a dual job, first, providing the desired information, and, second, making a truthful case for the birds so often, either thoughtlessly or maliciously, made the target of the guns of farmer or sportsman on the ground that they are "vermin". We trust that this booklet may have wide circulation among the Boy Scouts and that thus it may aid in offsetting the concerted drive being made by the arms and ammunition manufacturers and the alleged sportsmen's groups to wipe out hawks and owls. The booklet is priced at twenty-five cents and is available from the author at 337 72nd Street, New York City.

Cranbrook Booklets

Three booklets have recently been issued by the Cranbrook Institute of Science at Bloomfield Hills, Michigan. Two of these are listed as scientific publications and the other as a bulletin. The first scientific publication is an interesting report of study and excavation of the Indian earthworks in Ogemaw County, Michigan, by Fred Dustin. It has distinct archaeological significance and is available at fifteen cents a copy. The other in the scientific group is a study of the age variation in the teeth and skull of the white-tailed deer, made by Victor H. Cabalane, director of the Institute, and available for fifteen cents. The bulletin is the work of Lee R. Dice, and is a popular discussion of the habits and habitat of the prairie deer-mouse. It may be purchased for ten cents a copy. It is appropriate at this time to remind our readers that a most helpful booklet on the building of bird houses, and the methods of attracting birds to occupy them, has been brought out by the Institute. It is entitled *Bird Houses: How to Make and Where to Place Them.* The author is E. J. Sawyer, and the booklet is available at twenty cents a copy.

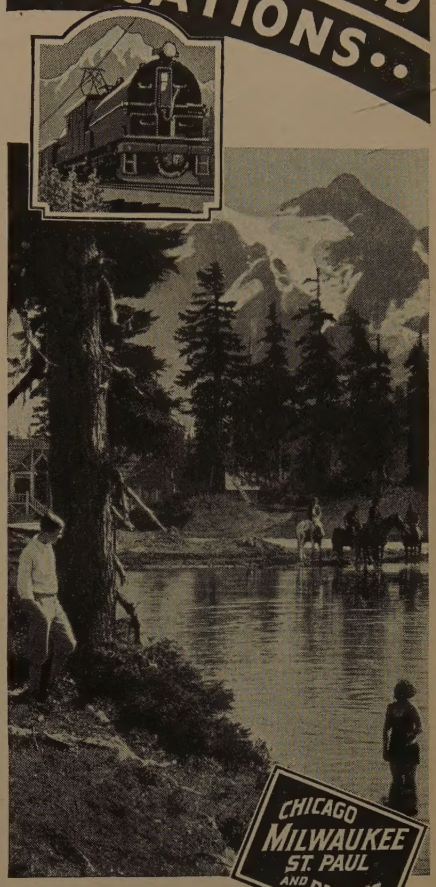
Editor, Nature Magazine:

Thanks for the copy of Nature Magazine and let me state that your editorial "This Business of Hunting" is most timely and worthy to be read by all the sportsmen of this country. There are so many who selfishly recourse to unethical practices that make for destruction if not complete annihilation of our choice game life; and it is imperative to educate the sportsmen as well as the public in general what we ultimately are facing.

Congratulations, and always depend upon it, that your articles are valued by members of the Izaak Walton League of America.

Sincerely,
Dr. M. D'Arcy Magee,
National Vice-President,
Izaak Walton League of America, Inc.

NORTHWEST WONDERLAND VACATIONS . .



Along America's
LONGEST ELECTRIFIED RAILROAD . .

LOW FARES

Check squares

- YELLOWSTONE Gallatin Gateway
- PUGET SOUND COUNTRY
- MT. RAINIER
- MT. BAKER
- OLYMPIC PENINSULA
- BRITISH COLUMBIA
- ALASKA

"A CENTURY OF PROGRESS"
ESCORTED ALL-EXPENSE TOURS
Return via California-Colorado or the Canadian Rockies if you wish.

Costs no more via the
OLYMPIAN
The electrified way
Scenically supreme

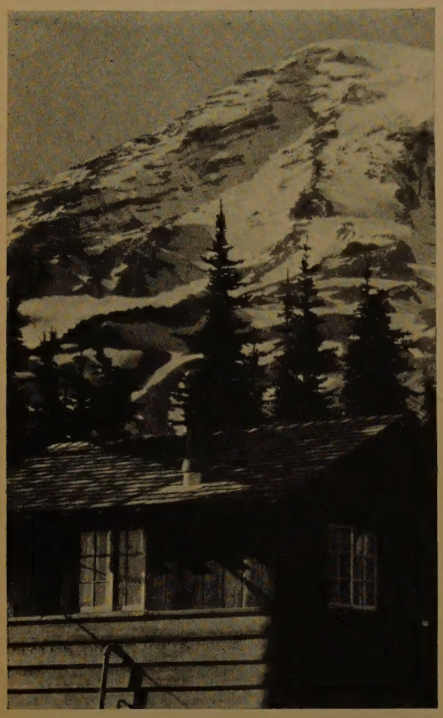
Geo. B. Haynes, Passenger Traffic Manager
The Milwaukee Road, 305 Union Station, Chicago, Ill.

I am thinking of vacationing as I have checked above. Please send illustrated folders and information. 1900-5

Name .....
Address .....
City .....State.....

Live in Rainier Park—

$4.00 a Day



IN pleasant bungalows facing The Mountain, you can live joyfully and completely for $4.00 a day. If you plan to travel with a friend and share your rustic cabin, the cost drops to $3.00. Stay a month—all summer—the peace of the high Cascades will fill your life. Take this kind of a vacation instead of medicine.

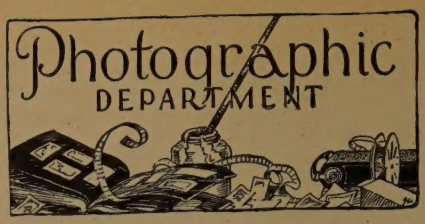
May we send you the Northern Pacific Rainier Park booklet? We will answer your vacation questions promptly and gladly—no obligation on your part, of course. Address E. E. Nelson, 158 Northern Pacific Railway, St. Paul, Minn.

NORTHERN PACIFIC
YELLOWSTONE PARK LINE

634

To the Pacific Northwest and California—America's Newest Transcontinental Train, the

North Coast Limited



Take Care of Your Camera

If your camera has been put away for a while and not used, take it out and, when there is no film in it, click the shutter a few times at the various speeds, to be sure that it is working all right and that no dust or rust has worked in to injure it. If you think that the shutter is not working quite right, by all means take the camera to some professional photographer or camera dealer before you try to use it. You may avoid wasting some good film.

Always be very careful not to put your finger on the face of the lens of your camera. If the camera has been put away where it is dusty, you should clean off the lens before using it. To do this you would not have to take it apart, as the inner surfaces are probably all right. Use a very soft, clean linen handkerchief or a piece of silk. Opticians sell special lens-cleaning tissue for a few cents, and some people prefer to use that.

Leica Photography

Number 2 of *Leica Photography*, a publication of E. Leitz, Inc., 60 East 10th Street, New York City, has recently appeared and can be had upon application to E. Leitz, Inc. This little bulletin gives interesting information on the costs of changing an old model Leica over to include the latest improvements. Of specific interest are articles on photographing small objects, including insects, with the Leica camera, and full information as regards equipment is given. One article explains just how the Leica camera may be adapted to the making of photo-micrographs—that is, taking pictures through an ordinary microscope. Particular attention is paid to the practical problems of insect photography. All Leica camera owners will be particularly interested in this and should, without fail, secure a copy of the bulletin.

New Zeiss Camera

A new mechanical and optical triumph is the long awaited Zeiss "Contax" camera put out by Carl Zeiss to compete with the Leica. The camera is about the same size and, like the Leica, uses standard motion picture film, taking thirty-six pictures on a single roll. Among the advantages claimed for this camera is the fact that there is no rotating knob on the outside of the camera with which the fingers may interfere and blur the picture at the instant of exposure. The range finder is built into the regular finder of the camera and its operation is geared to the lens in such a way that the operation of the range finder actually focuses the lens, similar to the manner of the new Leicas. Setting the metal focal plane shutter winds the film automatically, so that it is impossible to take two exposures on the same film accidentally. The firm of Carl Zeiss offers for this camera a wide range of lenses, ranging from a speed of F:1.5 for work under extremely adverse light conditions. A special Zeiss Icon fine grained film is also offered by the same firm. Telephoto lenses up to 13.5 centimeters are offered, thus giving nearly three diameters of magnification. Those who wish the very finest of miniature camera equipment will do well to examine the new Zeiss "Contax".

Heavy Shadows

The artistic photographer often utilizes heavy shadows as part of the composition of a landscape, but strong shadows should be avoided when taking snapshots of people or animals. We should distinguish between shadows and shade. The shadow of a tree, falling across a person's face or part of a person's face, does not render that person unrecognizable to us in the flesh, but this same shadow reproduced in black and white on a photograph is very apt to make a very unsatisfactory snapshot. If the sun is strong, it is far better to coax the subject into the shade and use a little wider open lens, such as is possible with a double lens camera. In this way many blotchy appearing pictures can be avoided, and in their place you will have the kind of snapshots that people admire.

QUESTIONS AND ANSWERS

Photographic Editor, NATURE MAGAZINE:

Dear Sir: I am planning on buying a Kodak or other camera, and would you please suggest some of the most important points to consider? I want it for general picture taking and for the mountains, too. I am just an amateur, so one that is easy to work is necessary. Do you think a double lens is necessary?

Answer: Our advice would be, by all means, to choose a camera using roll film. Roll film is easy to load and easier to take care of when traveling than a film pack. Furthermore, there is less danger of getting light-struck pictures.

The size of picture you want is a matter of personal choice and somewhat a matter of expense. The very small cameras put out nowadays, which take pictures about 1" x 1½", can take such sharp pictures that they are capable of being enlarged to almost any size that a person would want. However, the making of enlargements adds a little to the cost of operation. If you are expecting to have a picture large enough to enjoy without enlarging, the smallest size we should recommend would be the 2¼" x 3¼" picture, or thereabouts. If pictures of this size are taken with a camera with a good lens, exceptional ones are fully capable of being enlarged many times.

For the absolute beginner or child a box camera with a single lens is much the best. Several of the leading camera manufacturers make such box cameras, which, for the same money, are about equally good. The limitation of such cameras is that they can take good snapshots only on sunshiny days.

Double lens cameras cost more but can take good pictures under conditions where single lens cameras ordinarily will not produce good results. There are box type cameras with double lenses, but most of them are larger and more bulky than the folding cameras. The smaller folding cameras are perfectly simple for anyone to operate. Most double lens cameras have to be focused according to a scale of distances from the

hotographer to the main object he is photographing, but it is not difficult to estimate distances accurately enough for good results with a small camera taking a picture not larger than 2¼" x 3¼".

If we choose a double lens camera, we find all sorts of lens speeds offered us. Lens speeds are gauged according to a ratio of the size of the lens when wide open to the focal length (focal length means the distance from the lens to the film). A lens with the speed known as F-4.5 on a small camera is worthwhile even for an amateur. Study the instruction book carefully to learn what size of lens diaphragm opening to use under various conditions. Some small cameras have these directions engraved right on the face of the shutter.

Experts differentiate between different makes of lenses, feeling that some are better than others for special work. In choosing a small camera for general purposes, this need not concern us greatly. The lenses on the standard makes of cameras, such as Eastman and Ansco, and on the cameras advertised in Nature Magazine, are all good.

Photographic Editor, NATURE MAGAZINE,
Dear Sir: Are the Verichrome films better than the ordinary films?

Answer: There are two well-known types of so-called "chrome" films widely sold in this country. One is the Verichrome, put out by the Eastman Kodak Company, and the other is the Plenachrome, put out by the Agfa Ansco Company. The simplest answer to your question is "Yes". The chrome type films are a little faster. They will generally give better exposure under favorable conditions. For most of the subjects encountered by the amateur, they will give an effect truer to nature—a better rendering in black and white of the colors as seen by the eye. Chrome type films are a little thicker. On the whole, the extra expense of the chrome type films will be justified by the results.

Photographic Editor, NATURE MAGAZINE,
Dear Sir: I am contemplating the purchase of an amateur movie outfit and should like your opinion as to the relative merits of an Eastman 16 mm. Kodak and the new 8 mm. Kodak. Is any great sacrifice necessary, from the point of view of quality of results, in achieving the economy of the lower-priced outfit?

Answer: The new 8 mm. Ciné Kodak is a very fine little instrument. It, of course, has the advantage of economy in operation. It is not possible to show as large a sharp screen image with the 8 mm. as with the 16 mm., and the decision rather depends upon what you are going to demand of your camera. If it is only for home use and for projection in your own living-room, on a small screen about 2½ feet by 3 feet, you will be entirely satisfied with the results obtained by the 8 mm. Ciné Kodak. If you contemplate showing your pictures before a large group in a large room and using a screen more than 4 feet in size, you would undoubtedly get sharper appearing results with the regular 16 mm. camera. However, a great many people expect from their motion picture cameras merely entertainment for themselves and their immediate friends, and, with that end in view, I believe that you would not make a mistake in purchasing an 8 mm. Ciné Kodak.

"I said *Big* TROUT!"

Big cold-water battlers in Canada at lower cost

"And here they are!"

THESE long, black-backed, cold-water Canadian square-tails with the big red spots—can you beat them? NO! So *big*, so *strong*, so *fast!* And the T. N. T. they pack in their tails is all yours to play with—to make a grapevine of your split-bamboo miracle—for less cost than when you can remember.

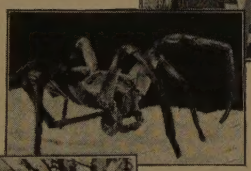
Yes, in the world-famous Nipigon country. Or, you will be just as quickly "that way" about the fishing in many another of Canada's wild, amber trout river and lake regions.

Come up and get some real fishing. On big, wild waters, in primitive country. Speckled Trout, Grey Trout, Great Northern Pike, Wall-eyed Pike. A wide choice of trips at low cost. Tell us your plans—we will gladly make suggestions, also go into details. Write or wire A. O. Seymour, General Tourist Agent, 7524 Windsor Station, Montreal, Quebec, Canada.

Canadian Pacific

WORLD'S GREATEST TRAVEL SYSTEM

(Right) **LEICA In the Jungle** with Felix Schoedsack, one of R.K.O.'s photographers, who uses the LEICA exclusively for "still" records of his movie-making expeditions.



(Left) Close-up of the "Wolf-Spider" made by James Leonard with the LEICA Camera and Copying Attachment. (Lower Left) LEICA photographic record of injured tree by M. J. Dorsey, Chief of Pomology, Univ. of Illinois.

EVERY PHOTOGRAPHIC NEED SERVED BY ONE CAMERA

AUTOFOCAL CAMERA

Leica

The perfect camera for nature lovers because of its small size, great versatility, and quickness, ease and economy of operation. 7 interchangeable lenses, including telephoto, speed, wide angle lenses, and others: choice of nearly 300 accessories. **Built-In Short Base Range Finder** gives you correct focus instantly; no guess work. **Focal Plane Shutter** with speeds up to 1/500th second. 36 pictures from a single roll of cinema film. Sharp negatives; enlargements up to 12 x 18 inches or more. Price, with 50 mm. ELMAR f:3.5 lens, $92.50. Write for Free Illustrated Booklet, "Why LEICA?".

Weighs only 19 oz. Fits the Pocket.

E. LEITZ, Inc., Dept. 269
60 East 10th St. New York

In all the WORLD *No Other* CAMERA *Like This!*

Because it is the only Quick-Acting, Automatic Winding, Ground Glass Focusing Camera using Standard Roll Film. Good for all purposes.

No Double Exposures with "PAL KO"! Used by Government, Educational Institution Experts and important Publishing Companies. Simple! Positive! Dependable! Even a novice can obtain perfect pictures every time! 3 Cameras in One! "PAL KO" enables you to take full postcard 3A, or ⅔ or ½ this size—making as many as 19 pictures on a six exposure film!

SAVINGS ON FILMS ALONE WILL SOON PAY FOR "PAL KO"! SATISFACTORY PERFORMANCE GUARANTEED OR MONEY REFUNDED!

No Separate Parts or Attachments are Necessary! The astounding features and quality work of "PAL KO" will appeal to you.—WRITE TODAY FOR FREE CATALOGUE.

PAL KO Inc.
819 Wash. Blvd. CHICAGO Dept. V

Let the Photographic Editor help you.

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

CONTENTS FOR APRIL · 1933

Photographic Department 156
Many Kinds of Fog . . Charles Fitzhugh Talman 161
Strange Maladies of Birds ..... S. F. Aaron 165
A Moth with a Semaphore
Lewis Wayne Walker 165
The Well-Named Devil's Club . . El Comancho 166
Red Squirrel A-Swimming Goes . . C. P. Martin 167
Pushing Back the Frost Line . . . . Jesse L. Smith 168
Feathered Personalities
John Lindsey Blackford 171
Rafinesque: Madman or Genius?
Donald C. Peattie 175
Tents and Camp Beds for All Purposes
Arthur Newton Pack 177
The Purplish Hard-Skinned Puffball
Dr. William A. Murrill 181
Ancient Flowers of Field and Forest
S. S. Dickey 182
Little Gardens ..... Romaine B. Ware 183
The Truth About Snakes
C. F. Greeves-Carpenter 187
Mythical Horse-Hair Snakes ..... L. C. Peltier 191
The Grouse of Gros Ventre ..... Smith Riley 192
Queer Quirks of the Moon . . . . Isabel M. Lewis 193
Cockroaches ..... Mary M. Cutter 195
Garden Department ..... Romaine B. Ware 197
Index to Advertisers 208

ORGANIZATION

THE MAGAZINE

PERCIVAL S. RIDSDALE ..... Managing Editor

ARTHUR NEWTON PACK ..... Associate Editor

RICHARD W. WESTWOOD . . Chief, Editorial Staff

R. BRUCE HORSFALL ..... Artist

EDWARD A. PREBLE ..... Consulting Naturalist

HARRY E. RADCLIFFE ..... Business Manager

THE ASSOCIATION

ARTHUR NEWTON PACK
President
Princeton, N. J.

CHARLES LATHROP PACK
Chairman Board of Directors
Lakewood, N. J.

PERCIVAL S. RIDSDALE
Secretary-Treasurer
Washington, D. C.

RICHARD W. WESTWOOD
Assistant Secretary
Washington, D. C.

HARRY E. RADCLIFFE
Business Manager
Washington, D. C.

WILLIAM L. FINLEY
Director, Wild Life Conservation
Jennings Lodge, Ore.

DR. E. LAURENCE PALMER
Director, Nature Education
Cornell University, New York

RUSSELL T. EDWARDS
Director, Educational Publicity
Washington, D. C.

SCIENTIFIC CONSULTING BOARD

DR. LELAND O. HOWARD — Principal Entomologist, U. S. Bureau of Entomology
DR. WALDO L. SCHMITT — Curator of Marine Invertebrates, U. S. National Museum
DR. HARRY C. OBERHOLSER — Biologist, U. S. Biological Survey
HENRY O'MALLEY — U. S. Commissioner of Fisheries
C. W. GILMORE — Curator of Vertebrate Paleontology, U. S. National Museum
VERNON BAILEY — Chief Field Naturalist, U. S. Biological Survey
DR. PAUL BARTSCH — Curator of Mollusks, U. S. National Museum
DR. EDGAR T. WHERRY — Wild Flower Preservation Society
DR. T. GILBERT PEARSON — National Association Audubon Societies
DR. WILLIAM M. MANN — Director, National Zoological Park

NATURE MAGAZINE, PAST AND PRESENT, IS INDEXED IN THE READER'S GUIDE IN YOUR LIBRARY

NATURE MAGAZINE is published monthly by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C. Additional entry at Greenwich, Conn.

Publication and Editorial Office, 1214 16th Street N. W., Washington, D. C. Additional Offices of Publication, Greenwich, Conn.

ONE YEAR $3
FOREIGN . . . $1 EXTRA
TWO YEARS $5
LIFE MEMBERSHIP $100

A. B. McClanahan, Advertising Manager

ADVERTISING OFFICES
New York—11 West 42nd St.
Washington, D. C.—1214 16th St.
Chicago—225 No. Michigan Ave.
San Francisco—304 Merchants Exchange Bldg.

Copyright, 1933, by American Nature Association

Title Registered U. S. Patent Office

A FLIM-FLAM GAME

• • •

BILLBOARD INDUSTRY SEEKS TO DIVERT THE INEVITABLE

• • •

DURING the last ten years the billboard industry has endeavored to meet the increasingly strong public sentiment against it by protestations of piety and empty offers of cooperation. For the most part these gestures have been specious, short-sighted and unintelligent. Their object has been to divert attention, to confuse the issue and to delay action, legal or otherwise, against the rural billboard.

The sophistry of these methods has made them ineffective. In spite of them the public will has been widely translated into legislation for restriction. From the point of view of an industry unwilling to make any concessions to popular demand, the situation is serious. And, this point having been reached, a sly cleverness has appeared in the defensive strategy of the champions of a billboard-adorned landscape. What is going on now in Massachusetts and New Jersey will illustrate the point.

When, acting under the authority of a popularly-voted amendment to the constitution, the Legislature and the Highway Department promulgated a code for the regulation of billboards, Massachusetts became a battleground. Realizing that these excellent regulations would become a model for many other states, the billboard industry immediately threw them into the courts through injunction proceedings. This was in 1925. Since then the billboard industry, by legal subterfuges—and these are legion—has kept the issue in the hands of the courts.

While the court fight has been going on, with the public interest represented by the Attorney-General of the Commonwealth and the publicly-supported Massachusetts Billboard Law Defense Committee, the billboard interests have been far from idle. The 1931 Legislature authorized the appointment of a special commission to study and suggest revisions in the laws on zoning, town planning and billboards. A representative of the billboard interests was made a member of this commission, and during the deliberations of the group billboard influence has quietly been brought to bear.

Now there has emerged from the commission a recommendation that would repeal the law upon which the vital battle for legal control of billboards has been based. This proposal is, at this writing, before a committee of the Legislature. In Massachusetts all measures must be considered by the representatives of the people. None can be pigeon-holed. In furtherance of their program, therefore, the billboard interests have employees and friends ready in every town to bring pressure upon their representatives in the Legislature, and are conducting a drive to misrepresent the cost of court action.

The issue is an important one. It is a question whether the expressed will of the people shall be vitiated by a synthetically conceived and insidiously planned offensive. It is a question whether the subterfuge of a minor interest may be allowed to protect it in the right to continue to parasitize upon the people in the face of their desires to the contrary. We do not believe that Massachusetts will allow this proposal to prevail, but it behooves those citizens interested in the beauty of their state, its importance in the tourist business and the safety of their highways to be continually on their guard.

In New Jersey the billboard interests fought desperately against a law levying a tax upon their signs—signs which were capitalizing upon the millions of public money spent on highway development. The tax law was passed, and methods not dissimilar to those now being employed in Massachusetts have failed to change it. But another and quite clever idea came to someone in the billboard industry.

There are many blank billboards, their space unsold because of economic conditions and because national advertisers are beginning to be dubious about using an unpopular medium. So an idea was born. Highway accidents are taking an annual toll of sickening proportions. So the billboard industry decided to become a great benefactor and to offer free space and free posters to a highway safety campaign. They would scream warnings from their billboards. It would be amusing were it not so sad an evidence of careless and superficial thought.

The billboard is placed close to our highways to advertise a product. In so doing it must attract the attention of the motorist. That is why curves and intersections are favorite spots for signboards. If the attention of the motorist is attracted to the sign it is distracted from the serious business of driving an automobile at a rapid rate of speed along a public highway travelled by other vehicles. If the billboard does not attract attention it is useless to the advertiser. It is an undeniable traffic hazard. It is a medium utterly inconsistent with any program of highway safety education.

But New Jersey, faced with a heavy traffic fatality list, fell for the industry's offer. It placed itself in the debt of the industry, just as other groups which have accepted free billboard space have done. The people of the United States cannot afford to hypothecate their rural outdoors to a small and unnecessary special interest.

"PASHA"
Reproduced from an
Original Etching
by
BENSON B. MOORE

NATURE MAGAZINE

VOLUME 21 APRIL · 1933 NUMBER 4

PHOTOGRAPH BY CAPT. D. WILSON-BARKER

FEELING HER WAY THROUGH THE FOG

The most ticklish job that the weather imposes upon the navigator is that caused by the blindness that comes when the atmosphere turns into thick "pea soup"

MANY KINDS OF FOG

BY CHARLES FITZHUGH TALMAN

RASH attempts have been made by professional weather-men to draw the line between fogs and clouds, and likewise to establish clear distinctions between fog, mist and haze. These attempts, like innumerable others in the field of scientific lexicography, have resulted in dismal failure. The very men who formulate scientific definitions are pretty sure, sooner or later, to find it convenient to ignore them. A meteorologist will tell you that a fog is a cloud resting on the earth, and then he will write about the "high fogs" of London and California, which are far above the earth, with perfectly transparent air beneath them. He will assert that fog and mist are wet while haze is dry, and then he will discourse volubly about the remarkable "dry fogs," usually composed of smoke or dust, that occasionally cover large areas of the earth's surface.

Fortunately for our present purpose it is possible to discuss fog and various fog-like manifestations of the atmosphere without insisting upon iron-clad definitions of terms. All the things I propose to talk about in this article have in common the property of obscuring the air to a greater or less degree. They thus affect what aero-

A LAKE OF FOG
Here it is shown filling a vast volcanic crater in Java. This crater is known as the Sand Sea, a descriptive name

ONE OF CALIFORNIA'S MANY SPECIALTIES
Fog from the Pacific rolling in over Point Loma, near San Diego

PHOTOGRAPH, U. S. NAVY

nauts, mariners and meteorologists call nowadays "visibility," and through so doing they play a rather prominent part in the practical affairs of mankind.

Because the fogs with which you are most familiar consist of water, I should like to begin by telling you of some that do not. Dry fogs, already mentioned, assume a number of interesting forms. Their lighter varieties are usually classed as haze—though haze is not always dry. There is a kind called water haze that is composed of sparsely distributed liquid drops. Another kind, known as "optical" haze, does not involve the suspension of either solid or liquid particles in the air. It is a state of things that often prevails on hot, calm, sunny days, when the bending of light rays "every which way" by a multitude of little air currents causes distant objects to look indistinct. This condition is also described as heat haze.

The lovely Indian summer haze of North America, though it may not, as the legend asserts, proceed from the pipe of the god Nanibozhu, is often due to smoke and still oftener to dust. In continental Europe dry fog was once commoner than it is today because of the custom, now largely abandoned, of burning the moors in order to prepare the land for cultivation. The stronghold of this practice was northwestern Germany and the regions adjacent. The land was drained with ditches and sections of turf were cut in the autumn. During a dry spell in May or June the clods of turf were piled in heaps and set on fire. This process produced huge clouds of smoke, which the winds carried far and wide. There was a saying that "when the moors are smoking all Germany smells it," but the smoke often spread far beyond Germany to Italy, Spain and Greece.

Smoke haze is a well-known feature of the climate of Africa, where the natives burn the grass and bush on a vast scale during the dry season, so that their cattle may feed on the young growth that springs up after the fire. With the recent spread of aviation in the once Dark Continent, the question has been raised whether this old custom should not be discouraged because of its effect in lowering visibility.

The red haze frequently encountered by mariners off the northwest coast of Africa, where early voyagers reported a mysterious Sea of Darkness, is due to dust borne by the trade winds from the Sahara; while the *bai,* or "sand mist," of the Far East consists of similar material blown from desert regions in the interior of China.

PHOTOGRAPH BY CAPT. C. J. P. CAVE

A MORNING MIST IN ENGLAND, WHERE FOGS ARE PROVERBIAL

Light fog creeping over the South Downs, Hampshire; a scene that Claude Lorrain would have loved to paint and Edgar Wallace to use as a setting for a crime

Travel by air is making familiar to many people the "dust horizon"; a sort of false horizon formed above the true one and marking the upper boundary of a layer of dust in the atmosphere. It is best seen from a lofty vantage point and is usually a straight line. A condition favoring its occurrence is that known to meteorologists as a temperature inversion; i.e., a layer of air near the earth's surface colder than the air above it. The cold air being heavier than the warm does not tend to rise and carry the dust aloft. At the Punjab hill stations, in India, this boundary line between chilled air below and warmer air above is a common sight in October, after the season of the "rains," when the soil becomes dry enough to form dust, and as its appearance ushers in the cool season it is called the "cold weather line."

Ellsworth Huntington describes a similar spectacle seen from a lofty mountain slope on the southwest of the Tarim basin, in Central Asia. He says: "Our gaze went out far beyond to where the last low hills gave place to a strange yellow band. It seemed at first to be the sandy desert of the heart of Asia; but during the two hours of our stay on the pass it expanded and rose, and we then knew it for the inevitable dust haze that shrouds the country more than half the year."

The most famous dry fog in history was the one that prevailed in both Europe and North America during the summer of 1783. A well-known description of it is that given by Gilbert White in his "Natural History of Selborne." He writes:

"The summer of 1783 was an amazing and portentous one and full of horrible phenomena, for, besides the alarming meteors and tremendous thunderstorms that affrighted and distressed the different counties of this kingdom, the peculiar haze, or smoky fog, that prevailed for many weeks in this island and in every part of Europe, and even beyond its limits, was a most extraordinary appearance, unlike anything known within the memory of man. * * * The sun, at noon, looked as blank as a clouded moon and shed a rust-colored ferruginous light on the ground and floors of rooms."

One of Benjamin Franklin's scientific disquisitions relates to the same event. He says: "During several of the summer months of the year 1783, when the effects of the sun's rays to heat the earth in these northern regions should have been greatest, there existed a constant fog over all Europe and great part of North America. This fog was of a permanent nature; it was dry, and the rays of the sun seemed to have little effect toward dissipating it, as they easily do a moist fog arising from water." Franklin correctly surmised that the fog of 1783 consisted of dust from the great volcanic eruptions of that year, and meteorologists today know of many other cases in

which the atmosphere has been obscured, though to a less striking degree, by widespread and persistent veils of volcanic dust.

Turning, now, to fogs composed of water, let us consider for a moment how these fogs originate. Though cases of waterless air are not unknown to science, air nearly always contains more or less water in an invisible, gaseous form—known as water vapor. The amount of this gas that can be present depends on the temperature. If a mass of air be cooled to a sufficiently low point, some of its water vapor condenses to liquid water, or, at extremely low temperatures, changes directly to ice. The condensation occurs around tiny particles in the atmosphere, called "nuclei"—which, in a great many cases, are grains of common salt—and thus produces a multitude of minute droplets or ice crystals.

PHOTOGRAPH FROM PROF. HOWARD T. BARNES

A BLACK FOG BUT NOT A SMOKE FOG

Fogs like this are seen over the St. Lawrence in intensely cold weather and their blackness is rather mysterious

Clouds and water-fogs, the visible steam at the nozzle of a tea-kettle and that formed by your breath on a frosty day, all owe their existence to the fact that, for one reason or another, the temperature is too low to permit all the atmospheric water present to retain a gaseous form. In the case of fog, the fog-making temperature may be reached as a result of cooling by radiation on calm, clear nights. The more moist the air, the more readily fog forms, and hence the frequent occurrence of fog by night along rivers and over marshes and damp valleys. Fog may also form where relatively warm, humid air drifts over a cold surface of land or water; and, on the other hand, a cold wind blowing over warm water will often produce a fog by lowering the temperature of the moist air overlying the water.

The water droplets in fog have often been measured and counted, and the amounts of water they represent in various samples of fog have been determined. They are so minute that several million must be combined to make an average raindrop. The lightest fogs contain something like a thousand droplets to the cubic inch and the heaviest nearly a million, but in the latter case it is estimated that the amount of empty space in the fog is about 30,000 times as great as the amount of water.

In spite of the extremely attenuated state of the water in fogs, as indicated by the figures just given, the moisture they deposit on terrestrial objects is great enough to be of considerable agricultural importance in some parts of the world. Thus along the coasts of Peru and Chile, where the rainfall is almost negligible, a wet fog from the sea, known as the *garúa* or *camanchaca,* supplies ample moisture for the growth of plants. A similar condition prevails along the coast of California in summer. The fog that rolls in every afternoon from the Pacific enables the farmers of that coastal region to raise big crops of beans and other products.

In the cases just mentioned the moisture from drifting fog is caught by trees and bushes and then shed upon the ground. This process is known as "fog-drip." The Island of Ascension, in the South Atlantic, depends for its water-supply mainly upon the moisture caught from passing clouds and fogs by plants growing at the lofty summit of Green Mountain; and the same process doubtless explains the stories of the "rain tree," which once grew in the Island of Ferro, one of the Canaries. This tree was a huge laurel, and a cistern (the remains of which are still to be seen) was placed beneath it to catch the drip from its leaves. Water from this source is alleged to have supplied all the needs of the small island in dry weather.

Town fogs, such as the famous "London particular," usually consist partly of smoke. You may call such a mixture "smog," if you like, for this word is now more than twenty years old and has found its way into dictionaries on both sides of the Atlantic. Smog is a common cold-weather product of large cities where soft coal is burned, and is likely to be dense when, on account of a temperature inversion, the smoke hangs low over the city instead of being dispersed.

Evidently a temperature inversion prevailed over Belgium early in December, 1930; not only causing a widespread dense fog, but also, in an industrial district of the Meuse valley, concentrating near the ground the poisonous fumes from many factories. It was these fumes and not the fog that caused a local epidemic of what the Belgians call "fog asthma" and the loss of many lives.

From time to time for many years accounts have been published in newspapers and elsewhere of the "pogonip," a death-dealing ice fog said to be common in winter in

some districts of the Rocky Mountains. A description that appeared as far back as 1887 in the *American Meteorological Journal* says that this fog appears even on the clearest and brightest of days. "In an instant," we are told, "the air is filled with floating needles of ice. To breathe the pogonip is death to the lungs. When it comes people rush to cover. The Indians dread it as much as the whites."

What is the truth about this icy fog and its effects? Polar explorers manage to breathe an atmosphere charged with floating ice particles, without experiencing the dire results attributed to pogonip. It is high time the pogonip yarns were checked up by meteorological and medical investigations.

One more fog-like or mist-like phenomenon deserves mention here, though it is quite outside the province of the meteorologist. People sometimes report seeing columns of steam or smoke rising from trees, and write to the Weather Bureau for an explanation—when they ought to apply to the Bureau of Entomology. These columns are not composed of water, ice, smoke or dust, but of insects, probably, in most cases, swarms of midges.

• • •

STRANGE MALADIES OF BIRDS

BY S. F. AARON

WHAT are the causes of the accidents that befall birds, largely during migrations, and that leave them unable to fly? We know that lighthouses and brightly-lighted buildings cause the death of many and perhaps injure many more, and that often electric wires kill them by checking their rapid flight. I have found many robins, catbirds, thrashers and woodpeckers lying dead beneath stretches of wires along public highways.

But we can only surmise the causes of many smaller kinds being hurt in remote sections. In the mountains of North Carolina I once found a parula warbler running on the ground and unable to fly, the delicate plumage unruffled, the elegant little creature not seeming to suffer. One wing was strong; the other could not be used, though it did not hang down.

In the lower New Jersey barrens I spied a northern water thrush in September sitting on a bush branch and so dazed that I could close my hand over it without the bird's struggling in the least. In the hope that it would recover I kept it for several days and until it died without gaining full consciousness. At another time I found a yellow-bellied sapsucker clinging to the bark of a tree and unable to climb or let go. Its feathers were also unruffled and I could find no sign of injury; it died within an hour.

• • •

A MOTH WITH A SEMAPHORE

BY LEWIS WAYNE WALKER

A FLASH of color on a pine tree drew my attention—but there was nothing there. Again came the flash, and then I discerned its maker. A small moth clung to the lichen-covered bark. Not so much as a shadow indicated its whereabouts. It seemed to me that even to his own kind he was invisible, but that's where the flash came in.

His under wings had three beautiful light-orange markings, which showed only when he lifted the large somber set. In repose, only the most diligent search of a keen-eyed bird would have discovered him. When sensing the presence of a family-member, however, he could advertise his nearness with a delicate flash of colorful beauty and then merge again with his lichen-covered tree.

THE WELL-NAMED DEVIL'S CLUB

BY EL COMANCHO

WELL-BARBED
In winter the thorns easily betray their viciousness

TO KNOW the devil's club you have to live with it in the woods winter and summer, go fishing with it, fall into a thicket of it, grab it with bare hands and camp beside it. And the better you know it, the less you like it.

To the calm and dispassionate scientist, devil's club is a shrub named *Echinopanax horridum* that grows to 12 feet with leaves 10 to 30 centimeters broad, all at the summit of the stem. It is armed with pale prickles, and is abundant in wet places. The leaves are palmately 5-13 lobed, with petioles and principal veins prickly underneath. But fishermen who have to fight their way through thickets of it all along the trout streams where it is sure to catch on the line, flies, clothes and gear, tear the hands and ruin the temper, have special words for it—words not as polite as vigorous.

The devil's club grows wherever there is plenty of water, preferably in the spring-water bogs on side-hills, along brooks coming down mountain sides or in the black, thick "muck" soil situations along trout streams or lake margins. At a distance it closely resembles the castor-bean plant with all but the top leaves removed, but it is a lighter green. It turns its broad leaves to the sun so that light comes through them in such a way as to etch the leaves out sharply against the dark green background of the somber fir forest in which it grows as an undergrowth of jungle-like aspect.

The thorns cover the stems in all sizes from an inch to a thirty-second of an inch, and each is as sharp as a serpent's tooth. They seem to be barbed like fish-hooks, and cannot be removed from the flesh without actually digging all around them. They will tear through clothing of heavy weave, and have the bad habit of breaking off under the skin, adding to the difficulties of their removal.

There has been considerable speculation as to whether they poison as well as wound those who come in contact with them. Although scientific works claim that they are "erroneously considered" poisonous, it is my experience that they actually are, authorities to the contrary notwithstanding. The gashes they inflict become sore and sensitive for a week or more, and heal very slowly. The same result occurs whether a perfectly new, clean, green thorn does the cutting or one impregnated with dirt.

It is likely, too, that the entire plant contains a poison soluble in water. An experience I had in the Olympic Mountains—one that I would not wish to repeat—is evidence enough for me. Four of us had camped beside a beautiful mountain stream, and used its water for cooking and drinking. The first night all of us became violently sick, exhibiting symptoms resembling arsenical poisoning. We were helpless for a day and a half, and so sick we could not break camp for four or five days more.

A test of our food proved it good, but, when I examined the brook, I found, around a bend above camp, a black-muck marsh completely covered with a jungle of devil's club through which the source of our drinking water flowed. I drank the water above without ill effects, and examined it for traces of arsenic and copper without finding those elements present. The only possible cause of our trouble, so far as I could discover, was the shrub that is called the "best-hated" plant in the West. It

EVIL IS AS EVIL DOES
Yet despite this plant's bad reputation and injurious habits, it is really handsome, especially when it bears its ripened berry cluster, and should make a fine ornamental

alone could have wreaked the havoc we experienced.

The woody stalks are tough and grow in stiff curves, so that they are very springy, rebounding when pushed aside with a vicious re-action that drives the thorns through clothes or even light-weight gloves.

There is always a faint, disagreeable odor about a thicket of devil's club that is immediately rank and very noticeable if the plants are disturbed. Strangely enough, when they sway and rub against each other in the wind, there is no increase in the odor.

The plants bloom in early summer with a cluster of greenish, inconspicuous blossoms that quickly give way to green berry-like fruit. This ripens into scarlet, plume-like clusters that resemble sumac berries, but vanishes within a week or ten days. As far as I know, birds or animals do not eat the berries, although their rapid disappearance suggests another agency besides Nature.

For all the bad character of this thorny enemy of man, it is really beautiful, and could be used to good advantage in parks or private grounds. It requires a sheltered situation, however, as its tender leaf-stalks cannot withstand strong winds, and grows naturally where firs or other trees will bear the brunt of the breezes.

The range of devil's club is from Isle Royale, in Lake Superior, west to Montana, Oregon and California and north to Alaska. It is also found in Japan. It is particularly prevalent in the Cascades, Olympics and other coastal ranges north of the Siskiyous, especially along the smaller mountain creeks and spring brooks. And fishermen have a name for it! Just ask a western angler.

• • •

RED SQUIRREL A-SWIMMING GOES

BY C. P. MARTIN

Out across Young's Bay toward the open expanse of water known as Stony Lake, we paddled in two bobbing canoes. On the left rose the rough rock ridge with its blanket of scrub timber, in appearance not a bit different than the thousand or so other ridges beyond toward the Hudson Bay region of Ontario. To the right a long granite-backed island, whose tall pines, cedars, hemlocks, and birches had evidently been touched by neither the axe of man nor the tongue of fire, reared itself out of the black water. In the air was the breath of autumn which had already set the hordes of wood warblers congregating for their southern trip.

Up ahead far out from shore leaped a large fish, its silver sides gleaming in the morning light. Then we both simultaneously noticed something else swimming in the water, something a quarter mile from either shore and headed toward the island. From a distance, it appeared to be a large snake, as its head cut the waves and its wake distinctly showed as a trailing V of ripples. We dipped our paddles faster and sped in pursuit.

"It's a turtle," excitedly yelled Murph as he approached more closely. "No, it's a rat.—Say, I think it's a squirrel." He pulled alongside to cut the swimming animal off from the island toward which it was pointed. And squirrel it was.

The frightened rodent turned in a circular path and swam close to my canoe. One more stroke and my paddle passed beneath the swimmer. Quick as a flash he grabbed the blade. Up my arm and across my shoulders he scurried to a dry perch atop the stern deck as far away from me as he could get. There he sat in apparent contentment, watching me take the camera from its case, unfold it, and load it with a plate. Perfectly still he sat, with a wise all-knowing expression on his face and his tiny hands gripping the gunwale and his fur dripping cold water, as I made the exposure. Up the bay for a hundred yards or so he rode the canoe deck, then my companion called that the passenger had deserted the ship, an ill omen if I were at all superstitious, a warning against crossing the rough waters ahead. But I'm no sailor. Strongly and as straight as an arrow the squirrel swam toward his original destination, the big island.

How the squirrel happened to take to the water we had no way of knowing. Maybe he was putting the expanse of the open bay between himself and some enemy, though he might have been seeking a new home before winter set in. Then again it's possible that he was a rodent Leander keeping a tryst with his Hero.

Whatever the cause of his aquatic adventure, we now had visual proof that the answer to the question: "Does a squirrel ever go into the water?", is Yes.

PUSHING BACK THE FROST LINE

• • •

SPYING ON THE SKUNK CABBAGE BEFORE SPRING CALLS IT FORTH

BY JESSE L. SMITH

WITH PHOTOGRAPHS BY THE AUTHOR

• • •

OF ALL the flowers of the woodlands, the lowly skunk cabbage is the real harbinger of spring. On most of the floral calendars within its range, it comes at the head of the list. Indeed, it is out and courageously lifting high its head even before winter ceases the savage and fitful onslaughts with which it always punctuates its retreat. And a brave showing it makes, baring its ample throat to the storm, while its rival for primacy, the hepatica, tightly closes its blossom under the snow, and sulks among the mottled leaves of last year.

It indeed gives warmth of color to the drab early spring woods; moreover, it seems of its own vital warmth to free itself of the wall of snow about it.

Often very late in the fall or when mild weather has been prolonged into early winter, in this part of northern Illinois, the skunk cabbage seems to be about to bloom. One may find suspicious-looking crust patches in low places in the woods which when pried into reveal a whole colony of plants pushing up with united endeavor against their frozen roof.

Here and there some stout plant may display well above ground the gray-green tips of the stout sheaths which enfold the crown of the plant. These, one might fancy, are ear tips expressing its alertness to maintain its reputation for earliest blossoming.

Such boldness, however, tempts fate. After winter has set in with no uncertainty and a series of cold waves, unaccompanied by snow, has gone through the woods, one may find that some rodent, hard-pressed for tender herbage, has been gnawing away at the exposed tops. Such a diet is strong condiment inducive of a racy breath, but it is probably accepted by furry creatures as a condition of the robust life of the woods.

Shufeldt says that the early Swedish settlers about Philadelphia called the plant bearweed because the bears relished the early green food and feasted on its leaves. We have no bears, but there is an occasional raccoon. He classifies rather close to the bear and might be suspected of munching away at the weather-beaten tips, although it would be more appropriate for him to be hibernating as does the bear in the depth of winter. So in the absence of ocular evidence we are inclined to suspect the rabbit or the squirrel.

It would be logical to suspect that the skunk cabbage "beats the gun" in the race for spring honors. Investigation indicates that this is the truth. I set apart one Thanksgiving Day morning for an investigation of this sort.

DOWN BELOW THE SURFACE
Rooted firmly below the frozen ground awaiting the call of spring

The weather had been so mild that for the time there was no snow and even the frost had almost left the sheltered woods. The earth, however, was saturated and the first shovelful brought water to view.

A stout plant the ears or sheath tips of which showed two inches clear of the ground was selected for the work of excavation and a pit two and a half feet in diameter and nearly two feet deep had to be uncovered to loosen the hold of its roots. By the time it had been dug water had seeped in from every direction, and the plant with its great root mass was pulled out with considerable difficulty.

How thoroughly the plant

anchors itself for its way of living. The rootstock, which was free of roots at its lower end, was blunt-nosed like a potato but rough and scarred. It contracted above into the crown of the plant which pushed up towards the light of day. From the upper part of the rootstock about seventy-five stout fresh-looking roots extended diagonally downwards. They were the active and vigorous ones and included the very latest to be developed. Below them were more than half as many old roots in various stages of decay and the scars at the end of the rootstock indicated where still older roots had been attached.

It seems that the new growth of the rootstock, with the roots that spring from it, is at the top. The rootstock pushes up; the roots pull down. The circular wrinkles on the roots tell the same story. The roots anchor firmly below and contract; they pull in the slack. It must be a hard pull, since here were seventy-five or more stout roots concerned more or less in keeping the growing end of the rootstock down well below the level of the forest floor.

Each root is individual; there is no branching, but minor feeding rootlets are sent out at lower levels. It seems that the plant once started in a favored spot occupies that spot indefinitely. There is no horizontal venturing as in the case of the mandrake, which fares through the woods as the seasons go by.

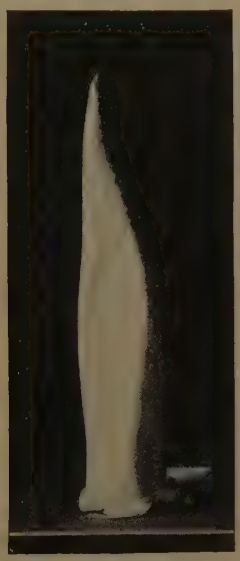
As the upper end of the rootstock grows, the lower end is not absorbed, critical studies of the growth processes of the plant made by J. Marion Shull indicate. The scarred lower end of the rootstock is attributed to the wearing away process caused by the roots pulling it down into the hard soil. This implies a slow decrease of length and therefore a considerable longevity in any old and vigorous plant.

Further to study the plant, we severed the rootstock at its contracted upper end. With admiration and awe we carefully manipulated the upper portion of the plant to loosen and unroll the sheaths, inflorescence and leaves to peer into the very inmost of the plant's being. Two or three layers of rusty brown epidermis representing leaf covering that had rotted away and then the great protecting sheaths open out. Thick and close-fitting, their smooth inner surface was as waterproof as oiled parchment.

When the outermost sheath was unrolled it revealed the first flower emerging from the folds of the second sheath the lowermost edges of which overlapped its base. The flower was set in a depression of the third sheath. Although this flower was nearly four inches long and the niche-like depression an inch longer, it was aborted.

When sheaths two and three were removed they showed flower No. 2 overlapped at its base by the clasping lower edges of sheath four and resting in a depression in the roll of yellow leaves that were now exposed. This second flower with its stout stalk was nearly six inches long and on this Thanksgiving morning its tip was less than three inches below the surface of the ground. It was a gorgeous affair, jewel-like in freshness, streaked and dotted with purple and brown and washed and spotted with yellow.

PLANT AND ROOTS
Equipped with such a root mass it yielded with reluctance



FIRST LEAVES
They were a beautiful golden yellow

SECOND SHEATH
Showing a tiny and aborted flower

A PEEK INSIDE
Immature blossoms of the spadix shown

The first leaves in the roll were a beautiful golden yellow, of celluloid luster, wrinkled and folded about one another, each unfolding opposite in direction from its neighbor. There were sixteen leaves in all. The first five or six, when carefully freed from one another and spread out, proved to average about five inches in width.

The seventh leaf unrolled readily but the eighth could not be unrolled without tearing and so was slipped off the twisted and spindle-like core, which was two and five-eighths inches high and flared at the base to five-eighths of an inch. The ninth leaf likewise slipped off the inner core but it was now a smooth and cone-shaped organ, only an inch high and flaring half an inch at its base!

Further labor brought to light a series of steadily diminishing cones until the sixteenth, which was less

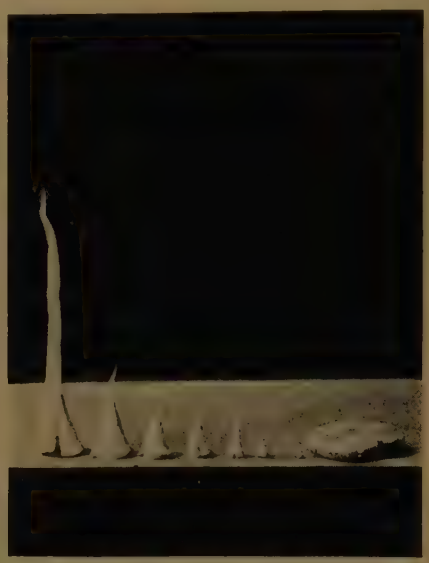
than an eighth of an inch high. This was as far as crude methods of dissection brought easily distinguishable results.

There was a flower at the base of every other leaf or leaf structure. There was a small aborted blossom at the base of leaves two, four and six. At the base of leaf eight there was a small live flower bud and likewise one each at the base of leaves ten and twelve. They were almost microscopic. It is probable that leaves fourteen and sixteen were similarly provided with a basal bud. It is also probable that the bud at the base of the eighth leaf might be the perfect flower for display one year later.

How fares a plant so well equipped as this for its growing season above ground when it is ringed about by winter's frost? The morning of Washington's birthday seemed a good time for an inquiry. Snow and zero weather had repeatedly visited the woods by that time.

LOWER END OF ROOTSTOCK
It was blunt-nosed like a potato but rough and scarred

THE SPINDLE-LIKE CORE
What was left when the eighth leaf was finally slipped off



DIVIDING UP THE CORE
There was a series of cones of steadily diminishing sizes

The ground was firmly frozen to a depth of six or eight inches even in the most sheltered portion of the woods. Two specimens of skunk cabbage, near neighbors, attracted attention by their gray-green tips. With a pickaxe we cut through the frozen soil, outlining a disk, eighteen inches wide, centering about the two plants, and then paused to consider and recover our breath. The problem was to pry off the solid disk, which was at least six inches thick, without injuring the plants.

Each plant, where it emerged from the ground, was the center of a shallow saucer-like depression as if the ground had thawed free again and again, and the water, seeping down by the stem, had carried with it enough soil to leave a hollow. Here the plant was frozen fast to the surface of the ground. With a penknife we carefully chipped a ring about each plant at the line of contact and then pried away the disk, which came up clear. The disk had served as a mold to enclose the plant stems. The openings through the disk, six inches in length, were lined with ice as smooth as polished steel. A few small patches of epidermis adhering to the ice were the only evidences of contact. One might conclude that the living plant was separated below the surface of the ground by a film of moist air from actual contact with the frozen ground. It was keeping the frost line back.

Another adventure that even more fully illustrates the skunk cabbage's fitness for a rugged life took place on April 12. By this time the skunk cabbage's habitat was dotted with hoods, although the frost was not out of the ground. The camera was set up before a fine specimen and the two inches of thawed surface soil shoveled away. Water seeped in as we dug and formed a pool about the plant. The ground was still frozen to a depth of three inches and the ice collar about the plant and standing back two or three inches from it extended down to that limit.

It is evident that the frost line in the vicinity of the plant was receding horizontally in every direction. The heat of respiration of the plant probably accounted for it. While on February 22 we found the frost close about a plant although probably not in actual contact with it, a neighboring plant on April 12 had pushed back the frost line three inches in every direction and stood a free agent surrounded by a frost pavement firm enough to bear the weight of a heavy man!

No wonder the skunk cabbage is the first flower of spring when it prepares so early to make its appearance.

• • •

One of the interesting features in the May issue of Nature Magazine is an article based on the study of the personable pair of gorillas in the San Diego, California, Zoo. The story is fascinatingly told by Belle J. Benchley, director of this institution.

AN ARTIST IN WHOSE SOUL MUST REST THE CONSCIOUSNESS OF IMMORTALITY . . .
ONE OF THE WILDWOOD'S FEATHERED PERSONALITIES

FEATHERED PERSONALITIES

BY JOHN LINDSEY BLACKFORD

ILLUSTRATED BY R. BRUCE HORSFALL

SOME cool sweet morning in late March or early April, if you chance to tread the dank places of the woods, you may hear the varied thrush, often called the Canadian or Alaskan robin. He is an artist in whose soul must rest the consciousness of immortality; lyric perfection such as his was never intended for a brief existence. And if you are wise and follow those rare moments with a further acquaintance, you will come to rejoice in his friendship. You have, in fact, met one of the wildwood's feathered personalities.

Personality, though it remains undefined, unless it be by the undefinable third person singular neuter, is recog-

nized by all. And even though it may wear feathers, as in the case of our bird friends, its charm is certain to captivate the rest of us. Indeed, so marked in individuality are the feathered folk, that whether we have made them the subject of life-long study, or know them only from an occasional jaunt over field and across stream, we leave them feeling that our acquaintance has been all too brief and fleeting. Surely one cannot listen long to the varied thrush without wishing he might capture the experience for all time.

Scarcely have soft chinook winds scattered the snow patches when, on waking some morning, you hear his vibrant note. Like the twang of a zither or the ringing note of a chime his music possesses something that adds an elusive tone of eerie mystery. Pitched low or high in a minor key his notes awaken an answering vibration in the heart of his hearer; henceforth your enthusiasm for this songster cannot be understood by one who has not as yet come under the spell of his enchantment.

Of him Louis Agassiz Fuertes has written: "His song is most unique and mysterious, and may be heard in the deep still spruce forests for a great distance, being very loud and wonderfully penetrating. It is a single long drawn note, uttered in several different keys, some of the high pitched ones with a strong vibrant trill. Each note grows out of nothing, swells to a full tone, and then fades away to nothing, until one is carried away with the mysterious song. When heard nearby, as is seldom possible, the pure yet resonant quality of the note makes one thrill with a strange feeling, and is as perfectly the voice of the cool, dark, peaceful solitude which the bird chooses for its home as could be imagined. The hermit thrush himself is no more serene than this wild dweller in the western spruce forests."

In size the varied thrush is somewhat smaller than the western robin and trimmer in shape. His markings, however, are striking and beautiful. Across the brilliant burnt orange of his breast extends a crescent of black, while his back is dark bluish slate, the wings banded and edged with brown. A strip of orange brown lightens the dark slate of his head. The movements of the bird are quick, and until his alert shyness has worn off he is difficult of approach.

Always he seems to have a passion for spring. And like a lover he follows her northward each year. In the cool northern forests and high mountain meadows, where summer is but a blush upon the face of Earth, he finds her lingering in July and August. There he nests for a brief season, and, with the change of the year, drifts southward to the rainy coasts of Oregon and northern California. To me he is so much a part of spring that his ringing notes are the theme song of bursting buds, bright sunshine and showers, and soft spring breezes. Since I can remember he has been associated in my mind with the "Spring Song" of Mendelssohn. I have always thought that surely the great composer was inspired by the song of some European thrush when he wrote those notes of liquid melody. And if I am often tempted by one or the other to follow spring into the woods and mountains, it is because the song of spring is in the hearts of us all.

And though spring's lavish beauty is all about us bringing renewed life and hope, one cannot but have a poignant feeling of regret, even in this season of rejoicing, when the varied thrush goes northward. Perhaps it is because we are not quite consolable that another feathered friend arrives to delight us with a voice of incomparable sweetness.

He is the hermit thrush, a celebrity to Nature lovers, and the delight of all who hear him. His shy nature, however, and the fact that his habitat is always in the depths of the forest have given him the reputation of a recluse. But, like many another artist of rare ability, his retiring habits have failed to keep him from the public eye, and he is widely famed for his virtuosity. Truly a meistersinger, he is credited with being the finest songster of the continent.

"Three birds stand out in my life experience," writes Dr. Charles Pease. "The first is the hermit thrush; the only time I have heard him was close to evening by a small river in New England—that unforgettable purity of unbelievable melody!" And he continues: "The thrush in his many varieties belongs to the highest type of bird life. This gifted group leads me sometimes to wonder if man may not have blundered in conceiving himself as the topmost form of life. To be given the power of flight and the gift of song comes close to the apex of Nature's largess."

The species in its several variations is distributed from coast to coast; in the West the Alaskan hermit, the dwarf, the Monterey, and the Audubon hermit are distinguished by ornithologists.

The latter, whose range covers the Rocky Mountain region from near the northern border of the United States south to Guatemala, east to Texas, and west to the mountains of Arizona and the southern Sierra Nevada, is best known to the writer. The adult bird is some seven or more inches in length, upper parts grayish brown, chest mottled, and tail of a rufous color. In summer he is abundant in northwestern Montana along the south watershed of the Kootenai, and his vesper song at twilight is a most enriching experience. From the damp fastnesses of the forest where black birch, willow, and mountain maple crowd one another for the light that comes down through the tall tamaracks, his notes come sweetly, seeming not to break the hush of nightfall. How reassuring after the hot, tiring day! How restful and calm. What lessons of faith and hope might he not teach us! —that voice so full of certainties, so changeless in its serenity.

Almost never has a description of Nature been written comparable to the reality, but in her *Birds of Western United States* Florence Merriam Bailey, writing of the hermit's song, rivals her subject in the beauty of her words. She tells us:

"As you travel through the spire-pointed fir forests of the western mountains, you know the thrush as a voice, a bell-like sublimated voice, which, like the tolling of the angelus, arrests toil and earthly thought. Its phrases can be expressed in the words Mr. Burroughs has given to the eastern hermit, 'Oh, spheral, spheral! oh, holy, holy!' and the first strain arouses emotions which the regularly falling cadences carry to a perfect close. The fine spirituality of the song, its serene uplifting quality, make it fittingly associated with Nature's most exalted moods, and it is generally heard in the solemn stillness of sunrise, when the dark fir forest is tipped with gold, or in the hush of sunset, when the western sky is aglow and the deep voice rises from its chantry in slow, soul-stirring cadences, high-up-high-up, look-up, look-up."

Thoreau proclaims that, whenever and wherever a man hears it, there is a new world and a free country, and the gates of heaven are not shut against him.

Wandering up the watercourses of the western mountains mid fern and bracken and golden mimulus, one is often mindful of a slate-colored wren-like bird whose uncommon antics and clear melodious voice soon gain for him a place in your heart. The water-ouzel, or dipper, is a boisterous, cheery little chap, a gay bundle of personality plus. He dashes into and out of the water, perilously close to the strong currents, and teeters up and down on some wet rock amid the flying spume. He can walk on the bottom with swift running water over his head and come up dry as a duck. With a splash he dives beneath the surface to bob up here and there and then go off in swift flight over the foaming rapids. But soon you overtake him and hear him singing, adding sweet overtones to the music of rushing waters.

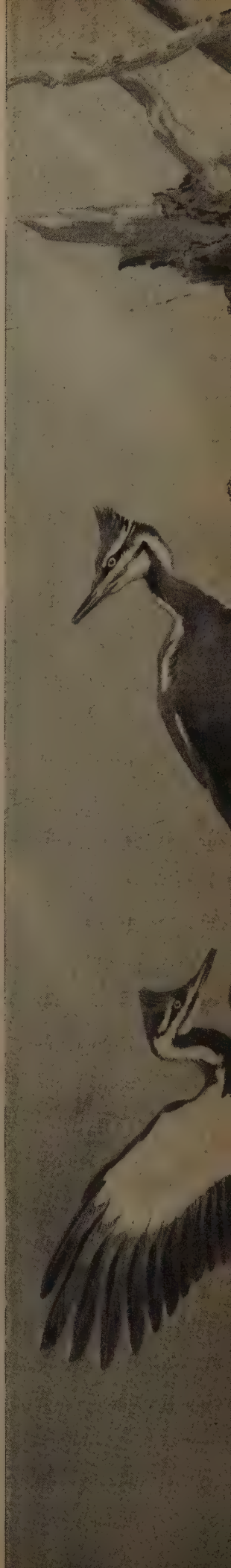
Springtime and fishing weather! Morning air with a cleansing fragrance of pine and balsam, and the jolly little dipper is that extra touch that makes a day complete.

Perhaps you can discover his nest, a fairy dream house, behind the gossamer curtain of a waterfall. Where the site is to his liking it nestles on a rockshelf, drenched by rainbow mists. It is a beautiful sphere of living moss, braced with twigs and well cemented. If the stream be small the nest is yet artfully placed near the water and the birds have been seen to sprinkle it themselves. They do it by diving into a pool, then going to the top of their wee hut and shaking themselves violently.

Unless you are familiar with the habits of the water-ouzel you would be amazed should you revisit the spot in winter. There he is along the icy brink of the cascade, a picture of urchin enthusiasm! Watch how he splashes about in the eddies or behind miniature waterfalls! Now he clambers upon a snow-capped boulder in midstream or explores some crystal grotto fashioned by the frozen spray. You may see him carried beneath the ice and feel the impulse to go to his rescue, but in a second he pops out at an airhole! Apparently he has left the weather out of his worries and you can find him at home in all seasons from the Yukon southward to the Isthmus of Tehuantepec.

The adult bird is nearly a uniform slate gray, a trifle lighter below, and the head and neck are tinged with brown. He is about as large as a robin, but the abbreviated tail gives him a "chunky" look. His family is allied to both the thrushes and the wrens although in their aquatic habits and covering of down they differ from all other perching birds. Consequently, we sometimes think of them as having joined the shore species.

John Muir, who found the wonder of the High Sierras a life-time inspiration, has told us much of what we know about the water-ouzel. He says in his *Mountains of California*



that the ouzel sings all winter and never minds the weather; and that so fond of water is this droll little fellow that he never goes far from the stream, always he flies close over the brook and follows its windings. His presence in the deep canyons or in the remote wilderness lightens that sense of loneliness and depression which the high solemn peaks are apt to cast over the wanderer despite their grandeur and beauty.

When next you behold this surprising bit of feathers, dipping and bobbing before you in friendly curiosity, drop your cares and follow him for a delightful hour or two. He is a perfect host and will show you all the sequestered haunts of the brooklet, the torrent, or the mountain tarn of which he is so proud.

It was near my home, about which is grouped a stand of virgin timber, that I had the opportunity of studying another of these feathered personalities. An elderly pine had lately succumbed to the larvae of the boring beetle, and my guest announced his arrival by a slow deliberate knocking upon its naked trunk. From my window I could observe him as he gravely inspected his find, prying here and there in the crevices of its bark and testing the toughness of the wood. He was, of course, of those species which we have unceremoniously dubbed "the woodpeckers," but he was a lord of the tribe, a pileated woodpecker or log-cock. This bird often measures eighteen inches in length and appears like a large hen to the astonished eyes of one seeing him for the first time.

Presently his "bugle call" brought his spouse to my dooryard. She came with powerful bounding flight and alighted near him. At my first approach they were shy and wary, keeping the tree between us, and flying when they saw what I looked like at close range. But as I was a persistent caller and the infested pine a perfect cafeteria, they became accustomed, and at last indifferent to my presence.

It was a revelation to me to see them at work. Among the Mexicans the ivory-bill is known as *el carpentero*, a name quite befitting, but I doubt if any other member of that trade could do as much with a single tool.

Upon locating a satisfactory place to begin operations, this arboreal craftsman sets diligently to work. A few preliminary pecks, a moment when, with head cocked back, he measures the distance, and then a steady pounding that makes the chips fly. The broad wedge-shaped bill is adze, chisel, hammer, and probe all in one. And the bird's long neck swings in such a wide arc that the head seems in danger of coming off. Nevertheless, the blow is well directed and the bill comes down with mallet-like force. A chip is cut out and then flecked off. Later I could find a little hole at the bottom of the larger cavity from which the worm had been extracted.

Two busy weeks it took to chisel out all the delectable young borers and then my friends departed. But they left me in a mood to find the removal of four wheelbarrow loads of bark and chips from our yard a light task.

The nests of this species give further evidence of their strength and skill as woodworkers, being cut in the solid trunks of trees. After reaching a depth of several inches the hole is driven downward for a foot and a half and the large white eggs are laid on a bed of fresh chips.

It is regrettable that the striking size and coloration of these birds have led to such a diminution of their numbers by human vandals, but if one can locate a pair early in the season they will afford many interesting hours of observation and study. A good set of binoculars may not disclose the secrets exchanged between the couple by means of the drumming which they do upon some dead branch in lieu of a love song, but the glasses are a most valuable aid in getting "closeups." And when the awkward youngsters appear you may share the comics of the nursery without worrying mother woodpecker overmuch. Altogether you will find these crimson-crested aristocrats among the "famous people" you want to know.

Early mornings in late October are of those experiences that cause us to regret the swift passing of time. Perhaps the fascination of these days of the last autumn month lies in the fact that Nature is about to reset the stage in her drama of the seasons. The chill air holds a threat of winter and the expectancy of change grips all the wild folk, sending geese and ducks southward, while grouse scatter, and deer and elk begin their herding. It is then too that the cold rudely awakens every sleeper who ventures into the woods overnight without a plentiful supply of blankets, and wet gray mists penetrate to the bone. But if you are in the mountains and awake to see the dawn light as it brightens, sending long silver shafts to the zenith and illuminating the dim forest floor, you will not complain much of the cold and may even linger in the making of a fire to watch the greater one building in the east. Quickly the mists are rising too, swirling down the long forest aisles and gathering in low wispy clouds over the deep valleys. It is at that hour, when the wild futuristic notes of the cock-of-the-woods are flung far out over the treetops, that one seems to come nearer the Truth and to an Understanding of Things.

RAFINESQUE: MADMAN OR GENIUS?

BY DONALD C. PEATTIE

ILLUSTRATION BY JEX

"GREAT wit to madness nearly allied is." The phrase has been applied to many men, some great, some rather more mad. Of none is it more true than of Constantine Samuel Rafinesque-Schmaltz, ordinarily called merely Rafinesque. Most men of his own time thought him plainly mad. Today people are beginning to think he may have been a very great naturalist after all, but the truth is that Rafinesque remains a man of mystery. There are many strange stories about him which are probably quite untrue; there are no doubt just as many true ones that we will never know. Although Rafinesque wrote 939 articles and books we still know astonishingly little about him.

Though Rafinesque seems to us to belong to America, he was born in a Greek suburb of Constantinople. It is part of the uncertainty of all information on this curious man that most writers have incorrectly stated he was born in Genoa. Even the date seems very uncertain; October 22, 1783 seems to be as likely a guess as any that have been made. His father was French, his mother German, so that altogether he was one of those international children frequent in Europe.

When Rafinesque was old enough to look about him and remember what he saw he found himself in a big luxuriant garden outside Marseilles, and there, as he says, he became a botanist. The first prize he got in school was a book on animals, and so he became a zoologist. In his day, when science was not so specialized, it was possible, even usual, for a naturalist to be interested in and even quite expert in both sciences. Throughout his life Rafinesque collected and studied and wrote about both plants and animals, not to mention medicine and chemistry.

Being an international child, Rafinesque speedily learned all the chief languages of Europe by picking them up rather than by formal study. In fact he had, like so many other great men, a sketchy schooling, but by the time he was thirteen he was collecting all the plants around the ancient cities of Genoa and Pisa where he then lived. It was at the age of eighteen that Rafinesque came to America. He made even the tedious journey a pleasure by collecting fishes and turtles from the Atlantic, until at last he saw the low-lying shores of Delaware. Rafinesque entered the employment of a wealthy merchant of Philadelphia named Clifford, and in that city and Germantown he lived, studying everything that his eager young hands could collect, birds, reptiles, fishes and flowers. He made an excursion into that favorite haunt of naturalists, the pine barrens of New Jersey, and haunted the sea coast.

The relish for these field trips had now got into Rafinesque's blood and the lad spent a year of poverty and happiness, wandering about Delaware, Maryland and Virginia. He was perhaps the first naturalist to explore the Dismal Swamp. On his return he stopped in Washington, met President Jefferson, Mr. Madison, and other public men. A deputation of Osage Indians was in the capital then and it is characteristic of Rafinesque that he entered into conversation with them and wrote a small dictionary of their language. Anything and every-

thing that came to his alert mind was as grist to his mill.

Rafinesque then went back to Italy, making his living by selling medicinal drugs in Sicily. At first all that he saw delighted him, the volcanoes capped with snow, the warm blue seas teeming with wonderful fishes, many unknown to science, the brilliant gardens, the charming people. Many of his paintings of brilliant Mediterranean fishes were considered by the great zoologist Cuvier, who lived in northern France and studied only the colorless fish specimens preserved in alcohol in the museum, as flights of Rafinesque's imagination. He was to meet with similar unjust scorn all through his life.

Finally, after ten years in Sicily, during which, as was discovered only after his death, he was unhappily married, the young naturalist wearied of Sicily and returned to America, bringing with him a great quantity of drugs and merchandise with which to set up business in America, besides fifteen boxes of precious specimens. But the old tub in which he crossed went to pieces off the coast of Connecticut. "I lost everything," says Rafinesque, "my fortune, my share of the cargo, my collections and labors of twenty years past, my books, my manuscripts, my drawings, even my clothes." The poor man had to walk, penniless, to New York, where friends found him a position as a tutor to some little girls.

This employment however could not last long, with a man as roving and erratic as Rafinesque, and we find him next talking with Audubon, the great bird artist, in Kentucky, or drawing a map of the Ohio River, or inspecting Mammoth Cave or the mound builders monuments at Chillicothe. Finally he returned once more to harness when he took a position as a teacher at Transylvania College in Kentucky. Here for a while he lived the life he loved, endlessly writing, collecting, and classifying. The mania for discovering and naming new species went to queer lengths with this half-mad genius; when there was nothing else to name, he classified the various kinds of lightning in the heavens. In this way he made some of the errors that caused his brother scientists to criticize him so severely; he wrote a book on the plants of Louisiana, where he had never been, from the accounts of an untruthful impostor, and he read books of travels and named new plants from the vague accounts in such books. He had another fault, and that was a cruelly sarcastic tongue; his good opinion of himself gave him a bad opinion of other scientists, and he said unjust things of them. In this he sowed the wind and reaped the whirlwind, being paid back with interest.

Rafinesque took a journey to Washington to patent his really remarkable invention of divisible commercial paper or certificates which the Treasury still uses. But others claimed the invention for their own and Rafinesque came back only to find that the president of the University, who hated science, had thrown all his specimens and books out of the window. These the injured scientist gathered up into forty boxes and with them wended his way back to Philadelphia, but on the way Torrey, the botanist, met him and welcomed him into his home. Rafinesque started a bank which was quite successful, for the depositors. Yet in 1840 we find the banker himself, the one time great naturalist, honored with degrees and medals, member of many learned societies, dead in a garret and penniless.

The rascally landlord locked his body in the room, having already sold it to a medical school. But friends of Rafinesque broke in, lowered the body from the window on ropes, and buried him in secret in a little cemetery now in the heart of Philadelphia. Until a short time ago his very grave was unknown, but now his remains have been given a place of honor at Transylvania.

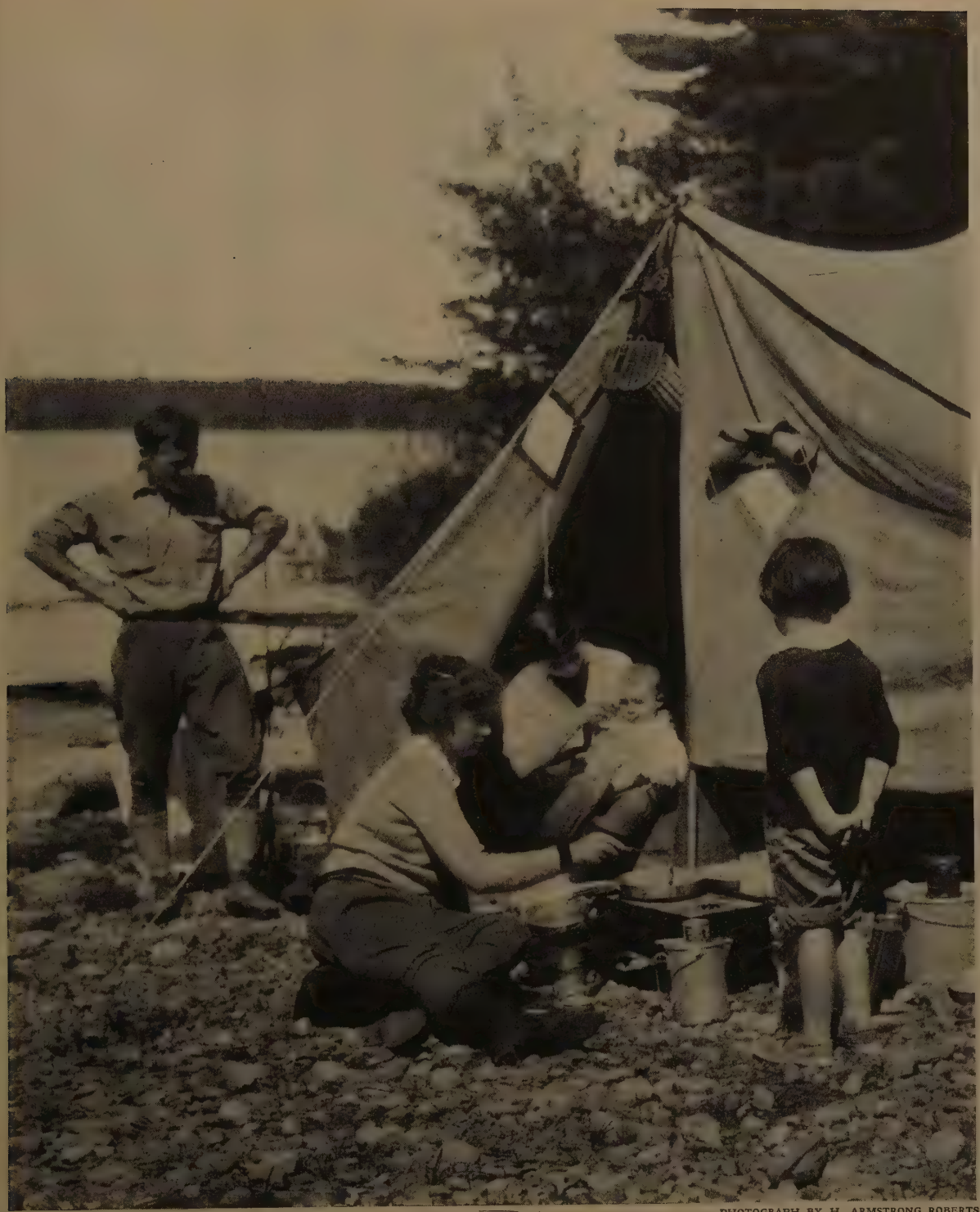
With his passion for collecting anything and everything, Rafinesque cut a queerer figure in the eyes of the serious and practical men of the backwoods America where he explored than he would even today. With his little green umbrella, his pockets bulging with specimens of rocks and plants and fish, the picture of Rafinesque chasing bats and bugs is a perfect comic opera caricature of the absent-minded natural history professor, old style.

But this should not blind us to the fact that Rafinesque, while eccentric to the point of the ridiculous, was a great man, how great we are only beginning to realize. In a dozen fields he blazed trails that would have led far had others followed them. He was twenty years ahead of Darwin in his idea of evolution, that new sorts of plants and animals are being continually derived from existing forms. For this he was ridiculed by Asa Gray, the great American botanist—Gray, the very man who defended Darwin later when times were riper for this startling new idea. Rafinesque is now considered to have been fifty or a hundred years ahead of his time, in this and much else that he did that seemed laughable then. Had Rafinesque had money and the ability to win the love of friends his name would have shone out as great, perhaps, as that of Linnaeus, Darwin, or Huxley, greater, anyway, than some of those of people who ridiculed him.

• • •

TEN-YEAR INDEX

This story of Rafinesque is one of a fine group of biographical articles by Mr. Peattie and others. Mr. Talman's story of fogs is one of many of permanent value in back issues of Nature Magazine. These are typical of the many articles that have outstanding reference value and make the first ten years of Nature Magazine a valuable complete work. Now these issues are made more valuable by the Ten-Year Index, available at one dollar a copy from Nature Magazine.



PHOTOGRAPH BY H. ARMSTRONG ROBERTS

PROPER EQUIPMENT MAKES CAMPING A REAL JOY

Human ingenuity has devised tents, bedding and a variety of other equipment that make roughing it possible for all members of the outdoor-loving family

TENTS AND CAMP BEDS FOR ALL PURPOSES

BY ARTHUR NEWTON PACK

GLORIOUS nights under the stars, dry, sheltered nights when the rain beats down on canvas overhead, nights of sound, dreamless sleep such as one may never know at home, are the good camper's reward. They are a great part of the charm that lures him forth in spring, summer or fall—back to the wilderness, back to the earth that seems to give him strength, back to the elemental struggle between Man and Nature. For the modern, super-civilized human being to draw close to Nature is for him a thrilling experience and a triumph.

Going camping may at first seem to him difficult. He does not know how and there seems no simple way to learn. Knowledge of such things as tents and sleeping bags belongs to a cult, initiated in their mysteries. But those mysteries are not beyond ready explanation, and they may be set down in cold type clearly enough.

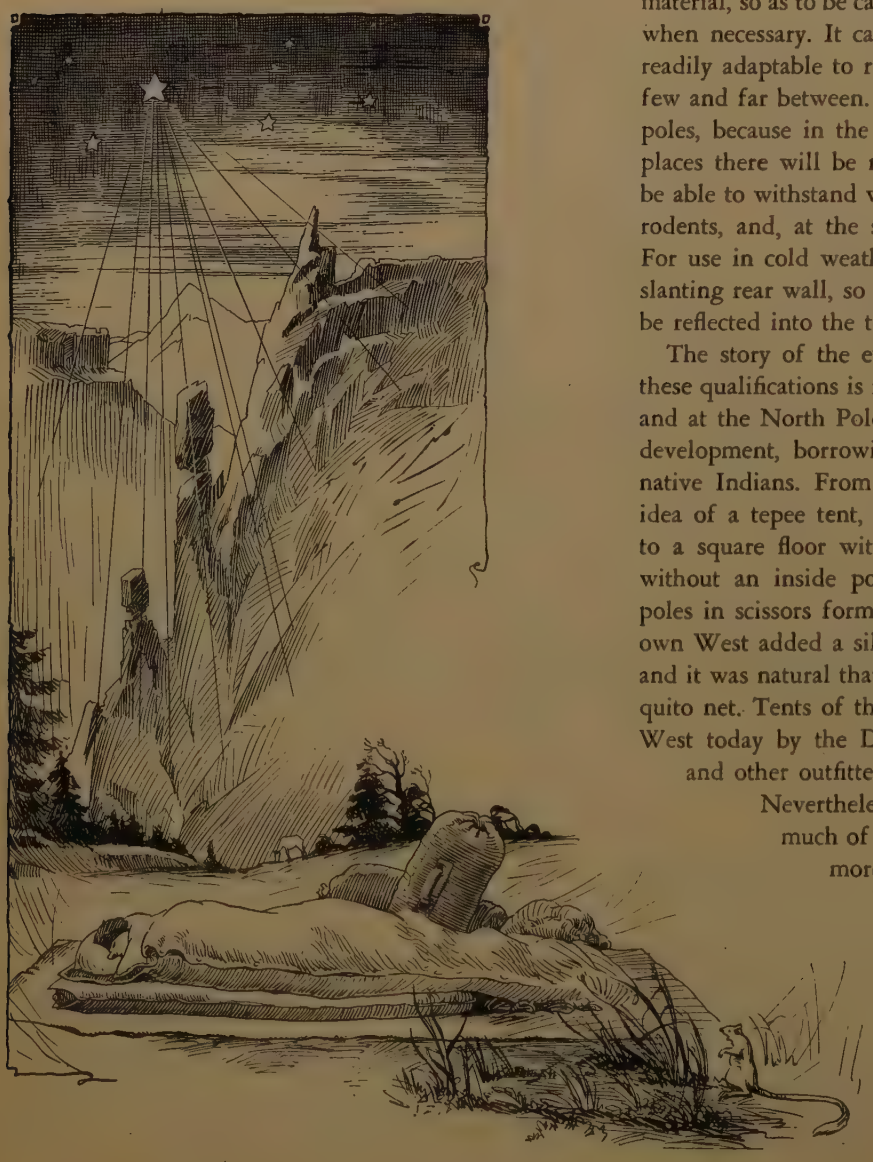
Camping outfits as used in various parts of the country often differ considerably. In the northern Rockies professional outfitters for trail trips generally supply heavy duck or canvas wall-tents, such as will stand a great deal of abuse in packing with horses. These tents fill the bill all right, but they also add to the total weight and bulk of the outfit very considerably. But for a canoe trip in Maine or eastern Canada, one requires the elimination of all unnecessary weight that will be a hindrance on the portages, and, therefore, waterproof silk and other light tent materials must be used. For automobile camping, manufacturers recommend large umbrella-type tents with poles and spreaders, easily enough carried in an automobile, but not suitable for a pack trip because the special poles and spreaders can not be conveniently packed on a horse, or for a canoe trip because of the weight. The hiker or mountain climber, even more than the canoeist, must have everything of the lightest. The lover of Nature, the photographer, the fisherman or the hunter who would like to vary his camping occasionally and to know the charm of altogether different sections of the country, can seldom afford himself to own all the different kinds of outfits to which we have just referred. If he is a good camper and likes to have the maximum of comfort, he is seldom content with a rented outfit, and he may well wonder how to solve the problem.

Another article in the series on camping giving practical advice based on long experience under all sorts of circumstances. Here one can learn how to sleep comfortably, keep dry and cozy and enjoy the wild to the fullest. The Camping Editor is at your service to give you further advice and particular points or refer you to any sources of special equipment.

It is obvious that the all-purpose tent must be of light material, so as to be carried easily on one's own shoulders, when necessary. It can not be too large, for it must be readily adaptable to rough ground where level areas are few and far between. It must go up easily with portable poles, because in the desert regions and in many other places there will be no natural poles available. It must be able to withstand wind and rain, keep out insects and rodents, and, at the same time, be properly ventilated. For use in cold weather, it should be of a design with slanting rear wall, so that the heat of a fire in front will be reflected into the tent for warmth.

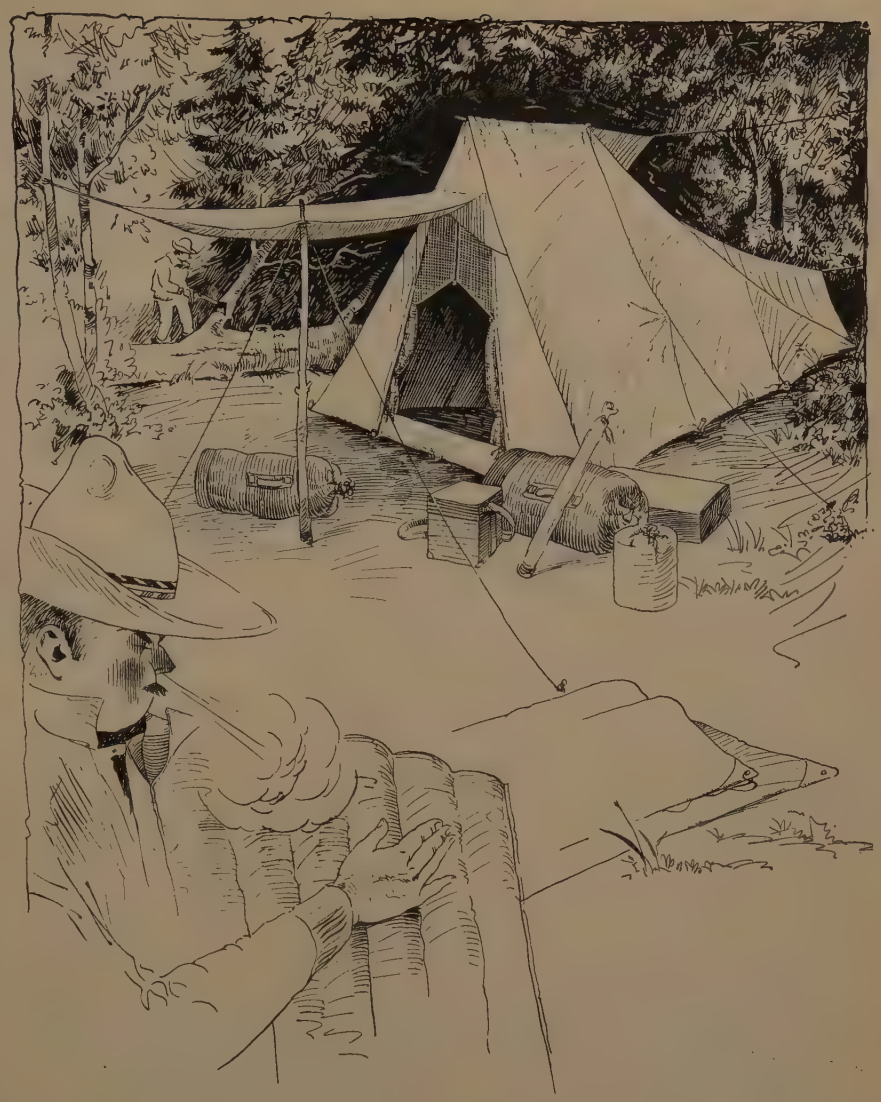
The story of the evolution of a tent to fulfill all of these qualifications is interesting. Explorers in the tropics and at the North Pole have contributed bit by bit to its development, borrowing many of their ideas from the native Indians. From the Indians came, originally, the idea of a tepee tent, simplified later by the white man to a square floor with a single central pole inside, or without an inside pole but supported by two outside poles in scissors formation. Some of the Indians of our own West added a sill across the door to keep out dirt, and it was natural that the white man should add a mosquito net. Tents of this character are sold largely in the West today by the Denver Tent & Awning Company and other outfitters, and are quite satisfactory.

Nevertheless those who, like explorers, spent much of their lives in tents, recognized that more room and comfort were offered by the white man's house-like



SLEEPING HAPPILY BENEATH HEAVEN'S ROOF

A proper sleeping bag or robe with the air mattress of sufficient length makes this a happy experience in the open

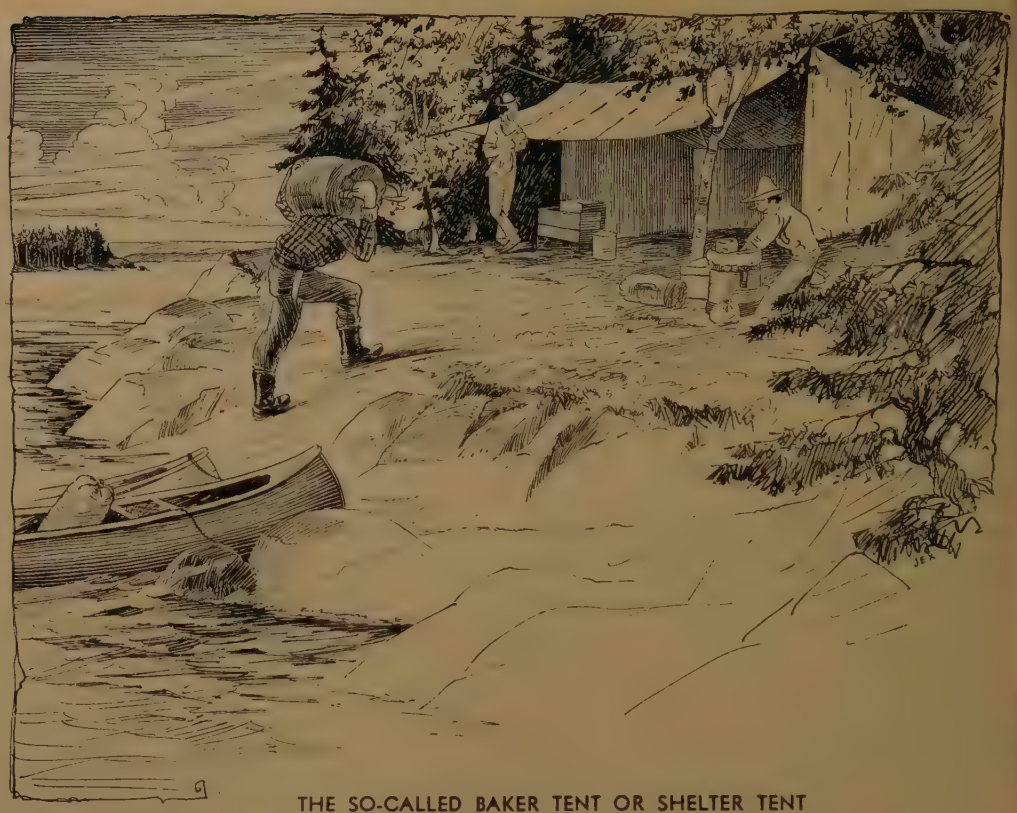


AN ALL-PURPOSE TENT
Compact for carrying, it can be set up to give the maximum room and made secure against insects, rodents and the elements, a valuable asset

A-tent with added side walls. The trouble was that the wall-tent was harder to set up, harder to hold down in a storm, and that it was not primarily designed to reflect and retain the heat of an open fire built outside. Accordingly, the next step appeared to be to combine the advantages of wall-tent and tepee. As a result, a large number of the exploring parties today in all parts of the world use a special tent evolved by outfitters in New York and Chicago, such as Abercrombie & Fitch, and von Lengerke & Antoine. From the front this resembles an A-tent, but the ridge, supported by a single inside pole with a T-shaped crossbar, is only about three feet long, while back of this ridge the tent slopes down on all sides like a tepee. A false continuation of the ridge serves as a storm-proof for a screened ventilating window. The door is a mosquito net divided in the center, but capable of being closed with a zipper fastener, and the bottom of the netting tucks into a divided sill, so as to be insect, snake, and rodent proof. Over the door is a cloth fly which may be held out on stakes to make a canopy or porch, adjusted as a wind-break or tied down tightly over the door. The rear of the tent, instead of sloping clear to the ground, ends in a low wall, while loops on the sides of the tent may be pulled out with extra lines to make side walls and give more room inside. The whole shape of the tent is sufficiently like the tepee so that a wind serves to hold the tent down rather than to blow it away.

This is the design of our all-purpose tent. It can be purchased in any materials, but the lightest goes by the trade name of "Tanalite". This material is a dark olive green which keeps out too much early morning light. In size 5 x 7 feet with a five-foot ridge and a sewed-in waterproof ground cloth, it weighs only six pounds and rolls into a package 15 inches long and 5 inches in diameter. A jointed metal pole, with T-shaped ridge and metal stakes, adds another six pounds to the weight. Any greenhorn can put it up properly in five minutes. Now, this 5 x 7 foot size is small enough for rough country, yet large enough for two persons without much extra duffel, and the height is sufficient to permit considerable facility in dressing. If the jointed center pole is left behind, the tent ridge can be suspended between two trees. To be sure, the Appalachian Mountain Club offers small hikers' tents which will weigh less than two pounds and will be preferable for hiking only, but it is our purpose here to obtain the maximum of comfort with a single outfit.

For long trips, comfort means a great deal. Two persons can readily obtain still more tent room by having more than one 5 x 7 tent, as above described. Each person can have a tent apiece, thus giving plenty of room for dressing and extra duffel; or we can pitch two tents close together with both canopies set in such a way as to make one a sleeping room for two and the other a separate dressing and storage room. Of course, we might simply use one 8½ x 7, or larger, tent of the same general construction and thus get a 7-foot head-room, too, but we should always have to have a larger level place to pitch it and the outfit would never be so flexible as two 5 x 7 tents. Incidentally, one 5 x 7 tent of the "Tanalite" material, with poles and stakes, costs about $32.00, while one 8½ x 7 tent costs just twice as much. In the larger tent cots may be used, while in the smaller there is hardly room; but, as we shall see presently, our all-purpose outfit suggests doing away with cots entirely.



THE SO-CALLED BAKER TENT OR SHELTER TENT
Its charm lies in the fact that it is open across one side and makes a fine place for lounging with plenty of air available

The tents we have been discussing are for sleeping, dressing, and duffel. The outside fly is a little small to cook under in bad weather. Where cooking is to be done in the rain, we need a different sort of rig. Some campers, when they are not in a country which grows good poles, simply make a sort of half tepee of poles and stretch over that a large canvas. Then, building a fire in front, they have warmth and shelter. A more up-to-date version of this, and one more easily adaptable to all sorts of circumstances, as well as being capable of use as a sleeping tent, is the so-called Baker tent or shelter tent. This is designed like half a wall tent, open across the middle, but with a large fly which can be put out in front on poles or used to close the tent itself. Under the fly one can do good camp cooking in bad weather, and the tent proper makes an ideal place to store duffel, to lounge and to rest. Its charm is the fact that it can be open to the air all across one side, and its practical value is that the shape of the tent reflects and holds the heat of a fire built in front. However, it will also serve as an excellent protection from the sun in the desert. Its one possible drawback for use as a sleeping tent is that it is more difficult to seal it against insects and small animals. When, as is generally the case, our party consists of one or more other persons besides my wife and myself, we take the shelter tent, too. It is 8½ feet by 7 feet in size and, therefore, plenty large enough to sleep the extra people. When their beds are rolled up, the tent makes the daytime headquarters for the camp, and the cook tent. This type of tent is often used with automobiles by simply stretching the front fly over the top of the car, whereupon the whole tent goes up without any poles at all. In a pole-less country one may take two collapsible metal poles to hold up the front corners.

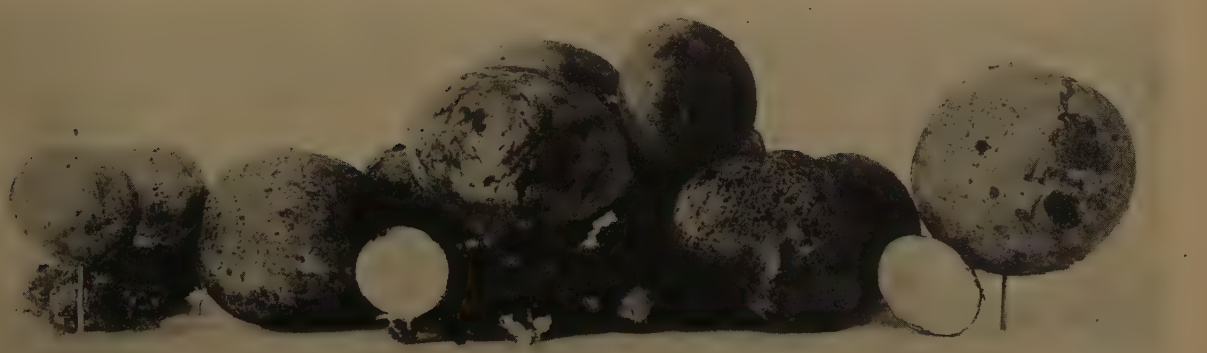
All of the tents here described are made of the light waterproof material known as "Tanalite". This material is not nearly so tough as canvas or duck and will not stand a great deal of abuse; but, if the tents are taken down and put up carefully, and if they are carried in strong bags, we have found them perfectly satisfactory for use even on a pack trip with horses. We merely take extra care in packing to have the tents located on the pack so that they will not be torn if the horse runs into trees or rocks. The Baker tent, without stakes, weighs only thirteen pounds. Together with the two 5 x 7 sleeping tents, it serves every need for canoe tripping, automobile camping or for horse travel for two to five persons. Ordinarily, we carry both the Baker tent and the two sleeping tents, together with poles and stakes, in a single pack sack which one person can carry considerable distances.

Our camp beds, like the tent outfit just mentioned, have been used on canoe trips; they have been used in the deserts of the Southwest, in the high Rockies of northern Canada, in Alaska, and at a little fishing camp in the Poconos. They consist each of a single eider-down sleeping robe made by the Woods Manufacturing Company of Ogdensburg, New York, and Ottawa, Canada, of the medium type known as the Arctic Junior. The robes fasten together with snaps or zipper fasteners into a bag which keeps out the night breezes. The robe itself is of the larger size—90 x 90—which makes for the greatest comfort in turning over at night and supplies sufficient material to pull over the head. Smaller people can use the smaller size robe—78 x 84. For each person we have also an extra soft wool blanket, in addition to the complete down robe. We have rigged the blanket to go inside the bag and be fastened to it with snaps, so as not to get all twisted around the sleeper during the night, as would happen if it were not capable of being fastened. We have, therefore, three possible combinations of warmth. For warmest weather the robe is opened and

just the blanket is used. The next combination is without the blanket but just the robe alone. The combination for colder weather is the robe closed with the blanket inside. The same combinations can be worked with a less expensive sleeping bag, such as that manufactured by L. L. Bean, of Freeport, Maine, and other outfitters. The Bean blanket bed rolls use a combination of light and heavy blankets. Their only drawback is that, in proportion to the warmth given at the maximum, the whole outfit weighs more than the outfit with the eider-down robe as its base. Persons who expect to do much camping in the late fall and in exceptionally cold climates may prefer a single eider robe of the heavier type, known as the Arctic (Senior). Such a robe obviates the use of the extra blanket but is not so adaptable to warm nights.

Some campers seem to prefer folding canvas cots, which are all right in their way; but a person can be warmer and just as comfortable sleeping on the ground with an air mattress, and, if he does so, he does not require so much room in his tent. The air mattress is a great invention. It makes a soft bed out of a rock pile. It compensates readily for the inequalities of ground and it is easier to find a place to lay an air mattress than it is to find a place for a cot so that it will not teeter. Air mattresses weigh from four to nine pounds and are now sold by most camping outfitters. They come in several lengths. Of course, a full-length air mattress weighs more than a shorter mattress and takes longer to blow up. The short length mattresses are designed to support the crucial points, such as the shoulders and hips, and when used are supposed to be supplemented to the full length of the sleeper by folded extra clothing. Inasmuch as our air mattresses are used for all purposes from canoe trips with portages to automobile trips, we compromise upon the shorter length and find it entirely satisfactory. Air mattresses should not be blown up tight, but just hard enough to keep the weight off the hip bones. Used in this way, they are as soft and comfortable as the box springs and mattress at home. To be sure, in the northern woods where there are evergreen boughs, it is possible to make a bed of them, but that takes time and patience and skill, and in many sections of the country there are no evergreen boughs available. The air mattress rolls up inside the bed, together with a small air pillow, such as is made by the manufacturers of the various makes of air mattresses, and the whole bed weighs less than twenty pounds, including the extra blanket. Such a weight is, of course, a little high for the hiker who invariably must carry everything on his back, but a sacrifice made in favor of weight decreases the ultimate comfort.

• • •



THE PURPLISH HARD-SKINNED PUFFBALL

BY DR. WILLIAM A. MURRILL

ANOTHER SHORT ARTICLE IN THE GROUP ABOUT THE HARD-SKINNED PUFFBALLS

A SPECIES that is frequently found about New York is the purplish hard-skinned puffball, *Scleroderma cepa* Persoon. I have also collected it in low spots and on shaded banks in Delaware, Tennessee, and Pennsylvania. It is smaller than the common Scleroderma, and the warts are not as conspicuous, while the skin is usually tinged with purple. It is rounded, between two and a half and seven centimeters in diameter, and covered with minute warts. A section in the young stage shows a broad white border, with a firm, wine-colored to black interior marked with whitish lines. This mass later becomes brownish and powdery and escapes through the rupture of the upper portion of the skin. It cannot be recommended to epicures for its edibility.

CONES OF THE RED SPRUCE
They are of two sorts serving two purposes

ANCIENT FLOWERS OF FIELD AND FOREST

BY S. S. DICKEY

SPRAY OF THE RED SPRUCE
Showing the other variety of its cones

AMONG the more primitive groups of flowering plants are the ferns, horsetails, club mosses, and so-called evergreens. It is quite evident, when these are casually examined, that they do not at once impress us as real flowers; and yet the systematic botanist sees in their structures and relationships some forerunners of the familiar flowers of lawn and garden.

Among this lowly tribe of plants is one named *Selaginella apus*. It is a dainty, vine-like structure, similar in outward appearance to certain of the mosses of the Mnium tribe. Its chosen habitat is moist meadows and sphagnous bogs where it forms showy green mats, as it twines amid the short grasses and roots itself to the sour soil.

THE TREE-LIKE LYCOPODIUMS
Typical of a group of plants that have come down to us from ages past

We had scouted many a bog and crossed innumerable wet meadows, before we chanced to discover Selaginella. It was early autumn. The hyla peeped feebly from his perch in the fringing silky dogwoods. A frisky red squirrel scolded from the dense hemlock stand by the margin of a grass-grown lumber road. Attracted by the bright scarlet fruit of evergreen yew, we leaned over to pluck a spray, and there in the soggy ground *Selaginella apus* met our gaze.

Lifting the sprawling stems revealed a number of slender roots or rhizoids. These are scattered at intervals, along the lower surface, and occur almost to the tips of the stems where the compact leaves form cone-scales. Although the so-called cones of Selaginella are not readily identified as such, examination with a lens shows that they hide at their bases little sacks that contain either pollen grains or ovules. When the latter are ripe they come into contact, and thus are the seeds made ready to reproduce the strange plant.

Another ancient flower is the horsetail or Equisetum. When the bright days of April come on apace, the wanderer at the sandy roadside or railroad embankment meets with a host of the curious flowers of this plant. We realize that although it is now small in stature, in days long gone the horsetail was a larger and more conspicuous plant! But Nature brought on a host of new plant life, and so the horsetail had to seek a habitat where competition was less severe and its dwarf stature a consequence.

FLORAL STRUCTURE OF THE EQUISETUM
Better known as horsetail, this interesting plant has shrunk with passing ages

In April, then, it thrusts

(Continued on page 204)

LITTLE GARDENS

THEY OFFER OPPORTUNITY AND PROBLEMS FOR THE GARDENER

BY ROMAINE B. WARE

COURTESY N. Y. "HERALD-TRIBUNE"

A PRIZE WINNING SMALL GARDEN

The screening background, simple planting and open lawn show excellent foresight on the part of the maker of this garden scene, who won the newspaper award

SMALL gardens are overflowing with opportunities. Greater skill is required to make a beauty spot of a twenty-five-foot yard than is needed for a hundred-foot lot. Planting mistakes, poor combinations and failure in spots can be overlooked in large gardens whereas similar mistakes in small plots become glaringly evident. Poor planning in large gardens may be partly concealed with mass plantings, but there is no masking, no concealment in the smaller area. For this reason the little garden of quality deserves sincerest commendations.

If there is one all-important qualification vital to success of little gardens, I think it may be summed up in the word discrimination. Unless one chooses carefully between what should be included and what left out of the small garden, the planting will lack quality. Unless there is a curb upon desire to spread the garden over too great a percentage of the yard area, poise and repose will be lacking. A crowded scheme is never in good taste for small lots. Too, there must be discrimination in color schemes of little gardens. Large areas can include a much greater variety of color than those of limited size.

Discrimination in the choice of material must not only consider color and size at maturity but duration of blooming season. Different varieties of the same kind of flowers vary greatly in this respect. As an example, most chrysanthemums are taboo in the little garden, because they occupy space the entire year but seldom start blooming until just about the time killing frosts are due. Some of the new 'mums, however, start flowering in August and continue until frost intervenes. Aladdin, September Queen, and the new English hybrid, Donald Wells, all bloomed in a Pennsyl-

COURTESY N. Y. "HERALD-TRIBUNE"

A WELL DEVELOPED BACKYARD ADJUDGED OUTSTANDING IN ITS CLASS

This is another of the first prize gardens in the contest conducted by the New York "Herald-Tribune" in 1932. It graphically shows what can be done under adverse conditions

vania garden by mid-August in 1932, while four others —Early Bronze, Kitty Riches, Gold Lace and a species from China, *C. morifolium*—began their color display by the middle of September. Chrysanthemums are truly quality flowers, and these improved varieties permit inclusion in small gardens.

Four of the most important factors bearing upon success of small gardens are—planning or design, soil preparation, selection of material and care. These apply to any planting, but the smaller the garden, the more carefully they must be observed. The rule of keeping the center open or at least planted with comparatively low-growing material, is vital. It is never a mistake to maintain a good sized open lawn even in a small yard. Well-kept turf is a pleasing foreground and an ideal foil for flower and shrub borders surrounding it.

The small garden may well be likened to a room. The sky is its ceiling, a fence, hedge or screen of shrubs its walls, while flowers, blooming trees and garden ornaments, benches and tables are its furnishings. The taste with which the outdoor living room is arranged and furnished will measure its success. If cluttered up with more furnishings than the area warrants it will have a messy look no matter if the quality of material is excellent. If the design is poorly proportioned, even the choicest plants and excellent care can not remedy its shortcomings.

Selection and placing of garden ornaments may easily make or mar the garden picture. Over-elaborate benches, bird baths or other items are out of keeping in small gardens. There has recently become available in this country some delightful hand-hewn stone ornaments, imported from England and made of material quarried from the same pits that produced the stone for St. Paul's Cathedral, one of Britain's noblest temples. There are bird baths, jars, flower pots, pedestals and other ornaments, Druidic in their stark simplicity, nothing common or machine-made about them. Connoisseurs among garden lovers will truly appreciate them, especially for small places.

Besides the general rule of keeping the center open, the small garden should be kept rather formal in outline. Informal, irregular lines are seldom attractive in yards of restricted size. The arrangement of plants within the borders, however, should not be along formal lines, rather there should be an irregular grouping with different kinds in drifts and waves. By formal lines it is meant that borders surrounding the lawn area should be edged in straight lines rather than curved, that garden pools should be regular in outline—square, round, rectangular or oval—rather than informally naturalistic. A clever designer, thoroughly familiar with Nature's handiwork in the open, can sometimes develop a creditable small garden along naturalistic lines, but such plantings are quite rare.

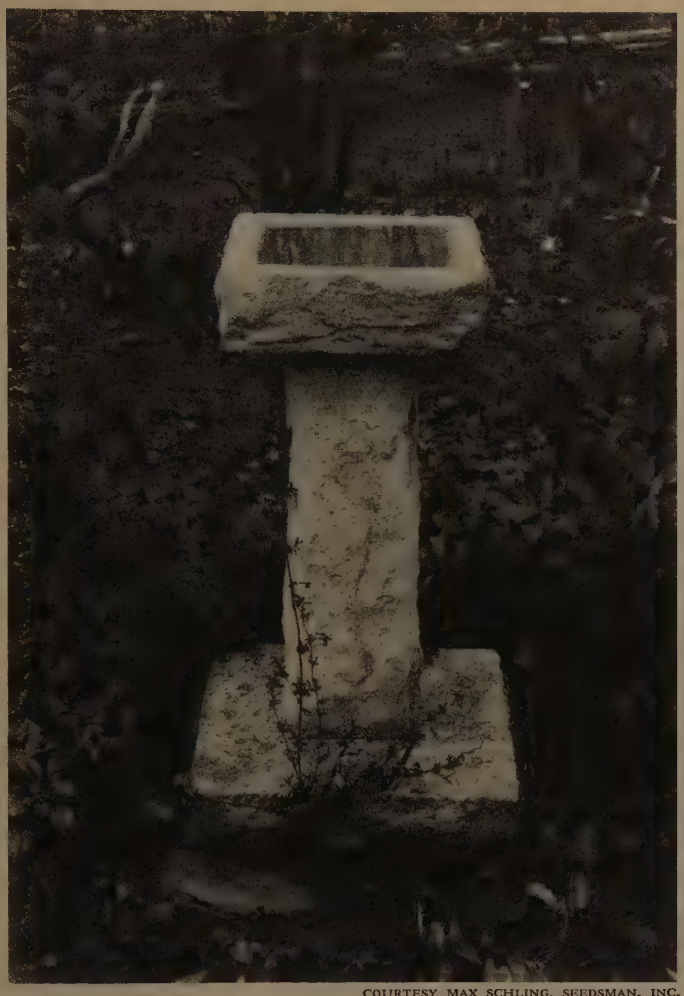
Every garden, large or small, is worthy of a suitable enclosure. Large gardens use informal mass plantings of shrubs and flowering trees. Smaller areas use hedges, walls and fences. Very small gardens, where space is at a premium, are generally best enclosed with a fence of lattice, wire, iron or saplings. Vines soften harsh lines while shrubs and tall perennials add their decorative touch. Fences, walls and plantings should act as screens, blotting out objectionable views and giving privacy to the garden as a whole. Hedges, with few exceptions, demand too much space both above and below the ground, especially below, where their greedy roots spreading far and wide preclude most other plantings within several

feet. The upright yews and arborvitaes are among the least objectionable in this respect.

Somewhere it is written, "No garden can be better than the preparation that went into it," and very true is that statement, not only of large gardens but of every size garden, even very small ones. All too many inexperienced garden makers are so anxious to "plant something" that they lose sight of the all important preparation which should take place first. One of the finest small gardens I ever saw had the soil prepared three feet deep over its entire area.

Preparation varies with different gardens according to the nature and quality of soil already existent. Perfect soils are rare indeed. Mostly we find sandy, gravelly soils or sticky clays, both of which need humus. This is decayed vegetable matter which is a supplier of food and acts as a sponge, aerating, holding moisture and at the same time encouraging drainage of excess water. Humus also increases bacterial action so necessary to the manufacturing of plant food. Humus may be supplied as well-rotted manure, leaf mold, material from the compost heap or in various commercial forms available today. Peat moss is a form of humus used a great deal today, especially where acid soil is not objectionable. It aids in checking weeds.

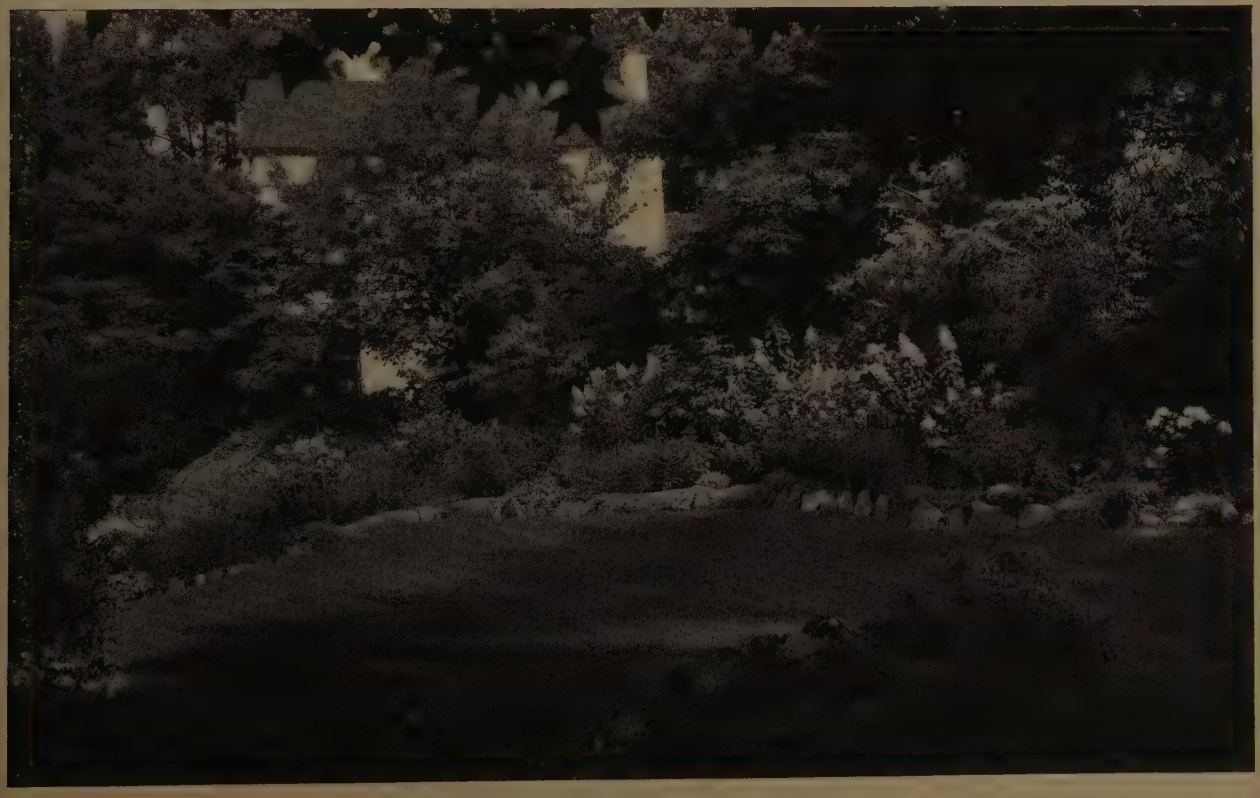
Soil preparation is more than merely spading the surface of the garden. If preparing new beds, trench thoroughly to a depth of two feet at least, breaking up the entire soil mass. Be sure there is good drainage below



COURTESY MAX SCHLING, SEEDSMAN, INC.

A BIRD BATH OF CHARACTER, HAND-HEWN IN ENGLAND

It is here effectively placed against a background of berry-bearing shrubs. (Below) Another small garden adjudged worthy of a prize in the contest for small garden achievement



PHOTOGRAPH FROM J. HORACE MCFARLAND

A CITY BACKYARD OF THE MOST DIFFICULT TYPE

A gardener was here confronted with a problem both in area and in environment but achieved nobly with a combination of open space, roses and annuals

this two feet and add liberal supplies of humus through the entire depth. The more carefully and thoroughly this preparatory task is done before starting to plant, the more successful the garden will be in years to come. It is a difficult matter to do much with poor soil after the garden is planted. Clay soils become soggy and sticky after rains, then, in drought, dry out so completely that they develop great cakes, resulting in wasting moisture from the subsoil. Sand and gravel lose moisture like a sieve and water passing through light soil carries much plant food with it, thus causing further impoverishment.

Garden soil well supplied with humus works easily and drains well but still stays moist. Plant roots easily penetrate far and wide in loose, friable soil. Iris roots are known to spread over two feet in good soil while ordinarily eight or ten inch roots are found. In specially prepared soil, regal and other lilies will extend their roots two to four feet and produce all the better blooms and bulbs as the result. Extra time spent upon soil preparation before planting will be saved several times over each year in ease of care, better moisture supply and will result in a better garden all around.

With the little garden laid out according to space available and soil prepared, selection of material is the next step. Here, as previously mentioned, discrimination is absolutely essential. Small gardens must religiously exclude coarse, rank-growing varieties and all mediocre plants. Only the choicest, most satisfactory kinds can warrant inclusion in gardens of limited space. Hollyhocks, glorious as they are, occupy a lot of space considering the short season they are colorful and when cut to the ground after flowering, the bare spot is an eyesore. In large gardens short season bloomers are all right, but the smaller the garden the more definitely each foot of space should be made to supply color over a long period.

Too, in small gardens, plants occupying little space at maturity are more desirable. Violas, Iceland poppies, garden heliotrope, dianthus, columbine, coreopsis, forget-me-nots, heuchera, perennial flax, primroses, the veronicas, fall asters, the campanulas, irises, lilies, phlox and many other perennials as well as a host of annuals may be used. Plan the planting according to height of plants at maturity, tall things to the rear, low-growing kinds in the foreground. Use spring-blooming bulbs liberally.

The smaller the garden, the more necessary it have diligent attention because even minor imperfections in the intimate garden are noticeable. It is more desirable to have a small garden, perfect in detail and thoroughly well kept, than a large garden, the care of which becomes a burden. Better have a little garden filled with the choicest specimens than a large place devoted to ordinary things. Small gardens are truly large in opportunities.

THE TRUTH ABOUT SNAKES

HOW VENOM IS TAKEN TO MAKE ANTIVENIN

BY

C. F. GREEVES-CARPENTER

• • •

EXTRACTING VENOM
The snake's fangs are pressed through rubberized gauze stretched over the top of a vial, the pressure causing release of the viscous, amber-colored venom

HAVE you ever watched captive snakes? Many believe that they charm or hypnotise their prey, but nothing is farther from the actual truth. A snake does not have hinged eyelids and, therefore, literally sleeps with its eyes open. Snakes have a fixity of gaze owing to this anatomical peculiarity which obviously lends credence to the stories one hears of their hypnotising birds and rodents.

Watch a snake as it slowly changes its position. How does it move? Instead of having legs, the hard, shell-like scales on top are enlarged on the lower surface of the reptile's body to form overlapping transverse plates, each being attached to a pair of movable ribs, so that a snake may be said to move by a series of lateral undulations on the ends of its ribs. The body of a snake is cold-blooded, but the scales are not wet and slimy as one unfamiliar with these reptiles always imagines but, to the touch, they resemble the surface of an alligator-skin bag.

The forked tongue which flashes gracefully in and out of the mouth with lightning-like facility is in reality an instrument by which the reptile feels surfaces, in much the same manner as a blind person reads Braille, and is not the "stinging"—or biting—apparatus. Snakes are well equipped with teeth, some having as many as four

NOTE THE PREHENSILE TAIL OF THIS GREEN TREE VIPER
An arboreal reptile whose coloration blends well with the foliage. An unwary traveler in the thicket is likely to be bitten on the face or shoulders by this snake

THE NON-VENOMOUS SUMBADORA
This species feeds on venomous snakes and iguanas, crushing its prey with its coils. It is dark blue above and ivory underneath, and grows to eight or ten feet in length

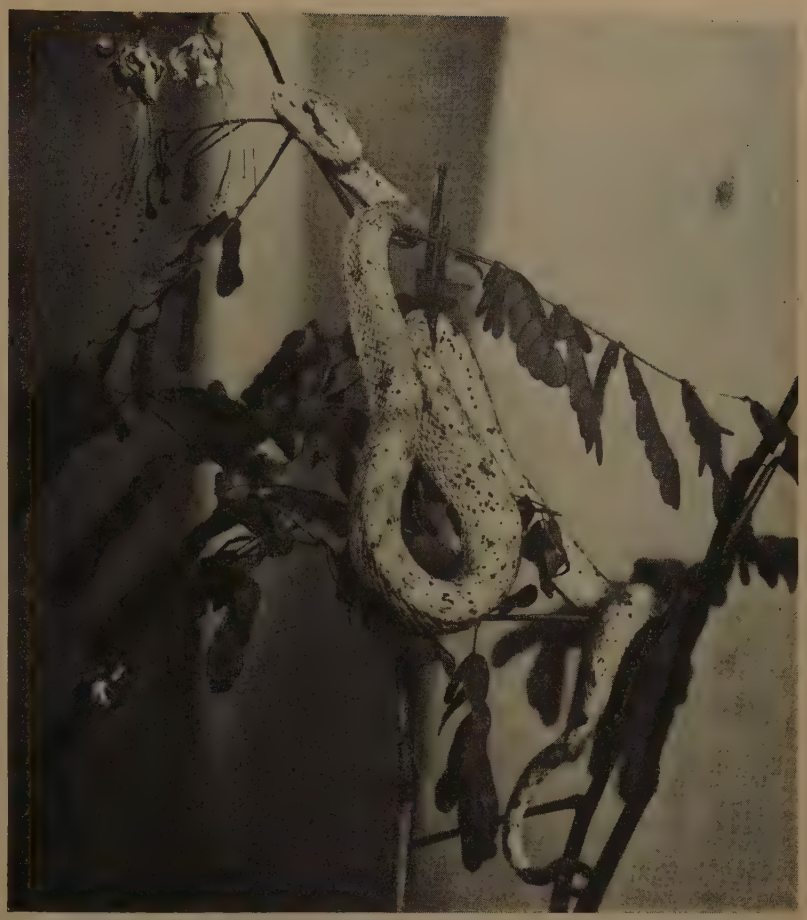
rows in the upper and two rows in the lower jaw! The teeth of the harmless varieties can scarcely do more than pierce the skin in biting and this, of course, is neither dangerous nor harmful. The venomous snakes have fangs which may either be fixed to the upper jaw bone or hinged, depending on the species. Also the fangs may have a groove on the outside down which the venom would be ejected. The fangs are curved down and slightly backwards, and as they are as sharp as hypodermic needles, they easily penetrate clothing and skin. The venom is stored in sacs connected by ducts with the fangs, and once the supply is discharged the sacs can only be refilled in from five to ten days. One drop of venom, though, would cause a decided reaction. Corpuscle destroying and nerve-deadening agents are the principal factors in a venom, the former causing a breaking up of the blood corpuscles and the latter affecting the nervous system. The proportion of the presence of one or the other of these agents determines the effect of the snake-bite.

It is not true that only the snakes having triangular-shaped heads are venomous, and the only test (other than being bitten!) would be to dissect the reptile to see if it possesses both fangs and venom sacs. One hears stories of the fangs being extracted, but accessory ones would quickly replace them.

Growth in length is obtained by shedding the skin, and the snake first works this loose around the lips as soon as sloughing commences, and it is then able to remove the old skin by peeling it off so that it is left on the ground inside out. There is a short period of blindness because, in shedding, the hard transparent covering over each eye is also loosened, leaving a small space between the old and the new scale or covering until such time as the reptile completely sheds its skin.

There are innumerable plausible fallacies and superstitions about these lowly denizens of our world but, without that glamor, they are most fascinating. Everyone who enjoys hiking, camping, fishing, hunting or the great outdoors should be informed about snakes so that they may

THE HOG-NOSED VIPER
This reptile inhabits Central America and northern South America. It is a small, slender and agile snake



HORNED-PALM OR EYE-LASH VIPER
This snake lives in the trees. It has a wide head and a prehensile tail but it seldom grows to a length greater than three feet. A beautifully marked snake of the Congo

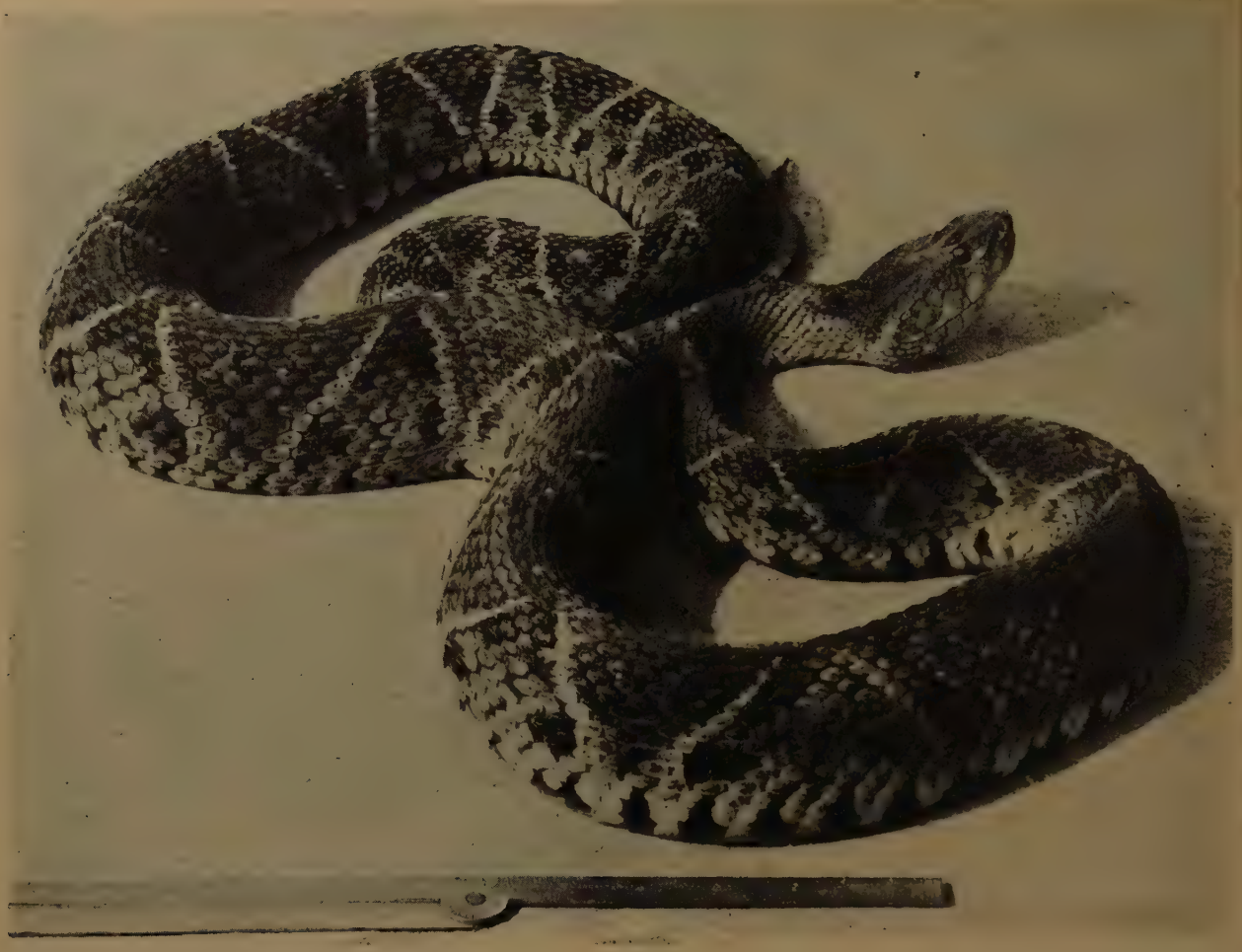
know the harmless from the venomous varieties, and be able to take sane, sensible precautions and to apply first aid remedies efficiently.

Of all snake venoms that of the Old World cobra (and its near relatives the coral snakes which inhabit the southern States and Central America) is the most deadly and against which there is no specific antivenin. Fortunately the coral snakes have only very short fangs, so even if one were encountered (and that would be very unusual) clothing would form a good measure of protection. Snakes, however, are never aggressive, preferring to escape the attentions of Man, and it is only when they are suddenly startled that they usually strike.

Science has tackled many problems for the safe-guarding of Mankind, and much credit is due for the development of antivenin. There are four well-known serpentariums in the world maintained for the extraction of venom and for the study of snakes. The one in Bangkok, Siam, deals with the venomous snakes of the Old World; that of São Paulo, Brazil, handles the snakes of South America; the Lancetilla (Honduras) Serpentarium extracts venom from Central American snakes, and the one at Glenolden, Pennsylvania, is maintained for the extraction of the venom of the North American species. These are the rattlesnakes, copperheads and their near relatives, the water moccasins. Here, also, antivenin against both the Central and North American venomous species is produced because the laboratory is operated in conjunction with the Lancetilla Serpentarium.

The venom is extracted by holding the snake firmly just back of the head, and pressing its fangs through a piece of rubberized gauze fitted over the top of a vial fixed tightly in a piece of wood nailed to the top of the work bench. After the "milking" operation, the venom is subjected to heat in an incubator in the Lancetilla Serpentarium until it crystallises. The crystals are labelled according to the species of snake from which the venom was extracted, and are then shipped to the Glenolden laboratory where they are dissolved in a saline solution.

IN THE SERPENTARIUM
D. D. H. March in the confine where many species of venomous reptiles are kept for making the antivenin



THE FAMILIAR FER-DE-LANCE OF TROPICAL FICTION
It is not fictitious in fact and is known in Central America as the Barba amarilla. It is the largest member of the genus Bothrops and attains a length of eight feet

The main difference in the preparation of antivenin for use against the venomous snake-bites of Central and North American species is that the venom of the latter is not crystallised but merely diluted.

Healthy horses are kept in the biological laboratories there and these are injected with the dilute venom, the first dose being 4/1000 of a gram given subcutaneously in the horse's neck. This small initial dosage is slowly absorbed and allows the animal's blood to manufacture an antitoxin which neutralises the effects of the venom. Weekly injections follow for a period of six months, each dose being somewhat larger than the previous one. At the end of that time the animal is deemed immune to the venom of the particular snake with which it has been injected, and from eight to eight and a half quarts of its blood is drawn off. This quantity may be painlessly extracted once a month for five or six times depending on the animal's condition. The blood is allowed to clot in special jars and an amber-colored serum rises to the surface, and this is drawn off, concentrated and sterilized, forming the antivenin which is put up in 10 cc syringes sealed at both ends. This quantity, which should be injected in the stomach muscles to off-set neurotoxic effects, is not sufficient except for first aid treatment, and subsequent injections would have to be given. The syringe is packed in a container with a needle and other sterilized accessories.

The antivenin for our North American venomous snakes is polyvalent, being made from the venoms of rattlesnakes, copperheads and water moccasins mixed together. It is known as Antivenin Nearctic. Two antivenins are produced for use against the Central American snake venoms. One of them is Antivenin Cascavel and is a specific for the tropical rattlesnakes, and the other is for use in cases of bites from snakes of the genus Bothrops which comprises the largest number of venomous snakes in Central America.

The position of the bite has something to do with the rapidity of its effect. If in a vein (which rarely happens) the venom might be said to take effect immediately as it would be diffused promptly throughout the blood stream. Otherwise, the venom remains almost local and much of it may be removed by making one-fourth-inch by one-fourth-inch incisions (first painting the area with iodine) with a sterilized knife or razor blade over the fang punctures and creating suction either with a suction outfit or by mouth if there are no cuts or open abrasions in it. The first step, though, is to keep the victim as calm as possible and to put a tourniquet above the punctures to prevent a return of the blood. This tourniquet would have

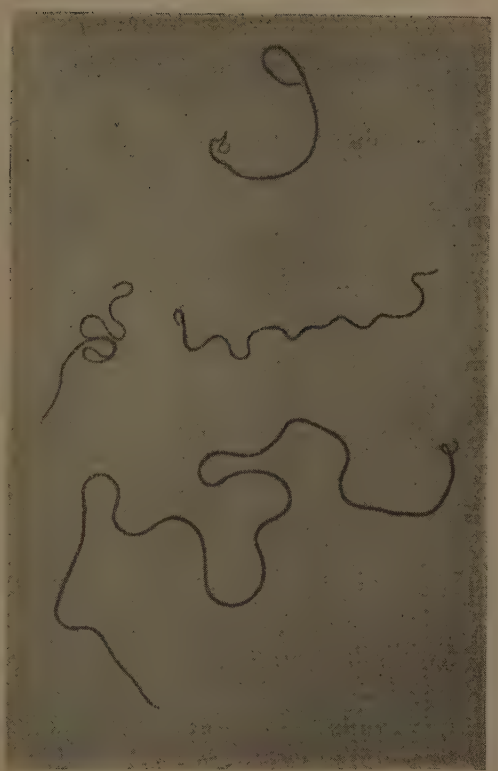
to be slowly loosened every fifteen minutes for a few seconds and then retightened. Then suction should be done for twenty minutes every hour, though the first hour would not yield much fluid. As the area of swelling advances the edges should be incised because that is the quickest way to remove the venom. Stimulants should not be given the victim since that would increase the blood circulation and the absorption of the poison. Venom from the North American snakes causes much local swelling and destruction of tissue, dizziness and vomiting; that of the Central American species does not produce such marked local effect but the nervous and respiratory systems are seriously affected as well as the blood and blood vessels so that there is apt to be a sloughing away of the flesh, followed by a partial paralysis.

Besides the venomous snakes which are apt to strike man if unexpectedly disturbed, there are the constrictors such as the boas and pythons, but no instance of a man being attacked by them has ever been reported. In North America we have a representative of the constrictors in the king snake.

A short visit to the local museum or the zoological gardens would quickly familiarize one with the venomous species of the locality, and save the wholesale, senseless destruction of snakes which are of great benefit to agriculturists as well as making it possible to identify readily those which are apt to be harmful to mankind.

• • •

MYTHICAL HORSE-HAIR SNAKES



MANY STILL BELIEVE THAT A HAIR FROM DOBBIN'S TAIL WILL LIVE

BY L. C. PELTIER

IT WOULD be interesting to know just how many of our great scientists, during their boyhood days, have pulled a long hair from the tail of old Dobbin and put it to soak overnight, confident that on the morrow they would find in its place a live and wriggling horse-hair snake.

Few objects of Nature are so consistently misunderstood as are these threadlike inhabitants of our summer pools and streams. Most people, if questioned, will class them as a "kind of snake", and a surprising number firmly believe them to be actual horse-hairs quickened into being by the action of the water just as moisture helps the grain of wheat or corn to sprout.

Horse-hair snakes are, of course, not snakes at all but belong to the order of worms. Like their near relatives, the pork worm and the hook worm, they are parasitic, though in this case the victim is not man.

These hair-worms, as they are properly called, may be found wriggling about in the still, warm waters of pond and stream or even in the roadside pools caused by the summer showers. They hatch from eggs that are laid in long strings and attached to water plants. Soon after they emerge, some of the tiny larvae succeed in boring into the bodies of aquatic insects, and a larger number wriggle out upon the wet margin of the pool and are there eaten by grasshoppers and crickets.

Coiled up within the body of the host, the hair-worm matures, and when again in the proximity of water it emerges and seeks the water to find its mate and finish its existence there.

The sexes of hair-worms are easy to distinguish with the aid of a small hand lens. In *Paragordius varius*, the most common species, the adult males are about thirteen inches long and have the tail divided into two tiny lobes. The females are slightly shorter with the body somewhat thicker and lighter in color and have the tail divided into three lobes.

The mortality among hair-worms is naturally quite high and an individual's chances of attaining maturity are slender indeed, but, as is usual in such cases, Nature has provided the female with the capacity for producing an enormous number of eggs to insure the perpetuation of the species, so they continue in the scheme of things.

IN THE FINE YELLOW DUST STOOD A BIG RICHARDSON'S GROUSE
He showed no desire for self-preservation and the car had to stop with a jerk in order not to run this independent and fearless fellow down

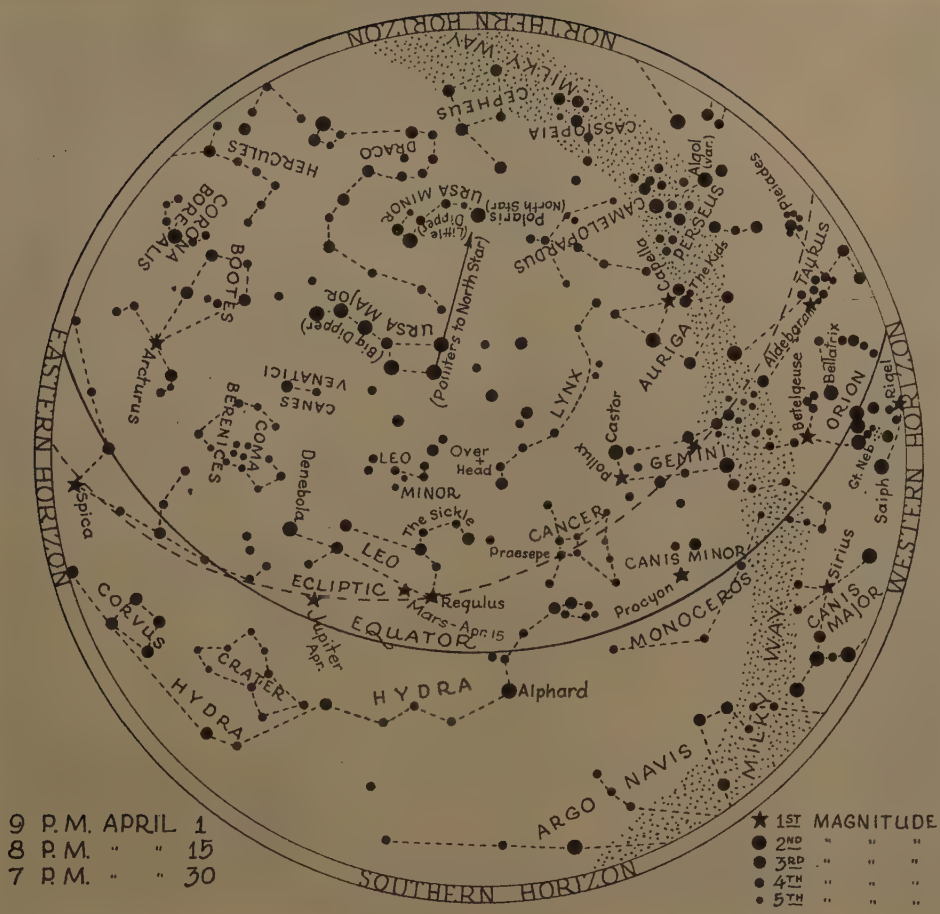
THE GROUSE OF GROS VENTRE

BY SMITH RILEY

IN THE fine yellow dust of the road stood a big male Richardson's grouse, head erect and feathers close with that air of readiness for immediate action. The bird displayed no tendency to step or fly aside to avoid the oncoming car. There was not the slightest fear, or any inclination towards self-preservation. The car had to stop with a quick jolt to save the bird. When the five passengers stood about, intently watching and exclaiming over the unusual behavior, the bird ran over, or between their feet, displaying a decided tendency to keep close, though it constantly ducked and ran this way and that to avoid having hands placed upon its head or back. Curiously enough the grouse did not object to being touched along the sides below the wings, or on the breast. In fact, it did not mind being picked up as long as one's hands were placed under rather than over it.

A slight quick movement of retreat and the grouse seemed to wish to attack. The bird would clutch with its beak, giving quick twists by a jerk of the head from one side to the other. Beating with half closed wings while scratching with its feet, he gave additional punch to these pecks and created bruises through a thick flannel shirt. Surely the answer to this behavior must be explained by a spot nearby where his mate guarded a clutch of youngsters. But search in likely spots revealed no family.

Two weeks later we decided to visit the grouse again. To the left, as we rode, the dusky red sandstone cliffs towered eight hundred or a thousand feet above the river. The lower half of the cliffs were moderate to steep slopes of decomposed sandstone with a thin to sparse growth of grasses, pale yellow in the leaf growth of last season and bright green in the tender stalks of early summer. The dominating colors were the dusky reds of the fine-grained soil only partly covered with a carpet of grasses. The upper middle portions of the cliffs were perpendicular, serrated battlements separated by deep, steep and narrow ravines. At the heads of the ravines and along the rim of the cliffs, gnarled limber pine and red fir trees grew in pictur- (Continued on page 205)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

QUEER QUIRKS OF THE MOON

BY ISABEL M. LEWIS

When the total solar eclipse of last August had passed into history, some of the fortunate observers began to compare their observed times of the beginning and ending of the total phase of this eclipse with the predicted times. They found a general agreement that the beginning of totality was about six seconds later than had been predicted, while the ending of totality was only about one second late. Evidently there was something queer about the observations, because, in theory, at least, if the beginning were a number of seconds late the ending should be late by the same amount. "Why?" they asked, and found the answer in a peculiarity of the moon itself. The edge, or limb, of the moon, as the astronomer calls it, is irregular in outline due to the mountainous character of the surface, and the roughness varies greatly at different points.

As it happened, at the point where the last bead of light disappeared at the beginning of the total phase of the eclipse, there was an exceptionally deep valley on the limb of the moon and sunlight shining through this lunar valley formed a so-called "Baily's Bead." This lingered on and on and affected the estimate of the time of the beginning of the total phase of the eclipse. Otherwise the total eclipse would have been estimated to have occurred several seconds earlier. On the other hand at the point where the first bead of returning sunlight appeared at the ending of totality the limb of the moon was remarkably smooth and the observed and predicted time agreed closely. The mean value of the two times was therefore taken as representing closely the difference between the observed and predicted times of the beginning and ending of the eclipse. Thus the amount that the predicted times were in error was assumed to be about three and one half seconds.

The moon is the one body in the solar system that least conforms to the path predicted for it. At the present time it is running ahead of its predicted position

by a small amount that can be quite closely estimated two or three years in advance but not for much longer. It is this uncertainty in the true position of the moon that makes it impossible to estimate to a second when a total eclipse of the sun will begin. There is also a small error in the position of the sun as calculated from tables, but this is small compared to that of the moon and does not fluctuate in value. Both of these must, however, be considered in calculating the times and circumstances of eclipses. It was suspected some years ago that the irregularities of the motion of the moon in its orbit might arise from a variability in the time of the rotation of the earth on its axis. It has not been proved for a certainty, however, that this is the cause of the peculiarities in the motion of our satellite.

Probably one of the queerest facts that we have to accept about the moon is that there is a certain portion of its surface that we can never see. It is a peculiarity of the motion of the moon around the earth that it turns once on its axis in the same time that it completes one revolution around the earth. It does not travel at a uniform rate in its orbit, however, so it is sometimes ahead of its mean position and sometimes behind it. Thus we see around the edges of the moon, as we might say. There is about forty-one per cent of the moon's surface that we never see; an equal portion that we always see, and about eighteen per cent that is alternately visible and invisible.

Another noteworthy fact about the moon that is rather discouraging is that, although it is, comparatively, so near to us, we are still thoroughly in disagreement, or in doubt, as to the cause of its most characteristic surface markings, the craters. There are those who firmly believe that the craters are of volcanic origin and others who quite as firmly believe that they were caused by the impact of enormous meteoric masses at a time in the far distant past when the solar system was not in the orderly, well-regulated condition that it is today.

We also know quite as little about the origin of the moon as we do of our more distant planetary neighbors, or the earth itself. Night after night we see it in the heavens above us calm and serene to the naked eye, rugged and barren and desolate in the telescope, a mocking world of mystery to the scientist who would fathom the secret of its origin, the nature of its physical features and the cause of the irregularities of its motion.

Different portions of the lunar surface differ greatly in their reflecting power. At the time of full moon there are no shadows on the surface of the moon and the contrast between the light and dark areas is due to the difference in brightness alone. The mountainous regions and the craters are brighter than the great maria or plains which are comparatively smooth and at lower levels than the surrounding surface. These maria are the large, dark areas so conspicuous at full moon. It was the astronomer Galileo who named the lunar plains maria, or seas, because viewing them with his crude telescope he was led to believe that their grayish appearance was due to the fact that they were covered with water. As larger and better telescopes were invented it was clearly seen that these maria were covered with a wealth of intricate detail and that there was no trace of water on the lunar surface. This was, of course, quite in accord with the fact that the moon clearly possessed no atmosphere. Although there might be portions of its surface covered with snow or ice, the existence of water or water vapor was impossible.

Queer names have been given to many of the lunar features. Although the mountain ranges on the moon bear the names of terrestrial ranges such as the Alps, Caucasus, and Apennines, the maria bear such fanciful names as Sea of Tranquility, Sea of Clouds, Sea of Fertility. Names of great philosophers, and astronomers, such as Plato, Tycho, Aristarchus, Ptolemy and Copernicus, have been given to the more conspicuous craters. The numerous, smaller craters bear the names of astronomers of more recent times, such as Flamsteed and Messier.

Queerest of all the queer things about the moon are the many popular beliefs about the influence of the moon over terrestrial affairs such as the weather and the planting of crops none of which have any more foundation in fact than the fanciful forms we see on the surface of the full moon such as the Man in the Moon, the Lady in the Moon, or The Rabbit. The tides which are raised on the surface waters of the earth by the moon, as well as the sun, are a direct result of the gravitational pull of these bodies and represent a form of lunar influence that has a definite scientific cause and is subject to proof.

April evening skies bring us the constellations that are always associated with the coming of spring, Leo, Virgo and Hydra with its Riders, Corvus and Crater. In the west the last of the winter constellations are drawing toward the horizon, Orion, Taurus and Auriga, with Sirius in Canis Major, and Procyon in Canis Minor, the Dog-stars, still conspicuous in the southwest. The Big Dipper is now high in the heavens above the pole. It is always seen at its best this time of year when it rides high in the evening sky. The brilliant, first magnitude stars, Arcturus in Bootes and Spica in Virgo, form with Denebola in the tail of Leo, the huge equilateral triangle that is a characteristic configuration in the evening skies at this time of year. Gemini, with its brilliant Castor and Pollux, we also associate with spring evenings because it is so conspicuous in the western sky at this time. Hydra is a long, rambling constellation that contains but one bright star, Alphard, a second magnitude star, southwest of Regulus in Leo. The head of Hydra, The Water-Snake, is marked by a small group of faint stars south of the inconspicuous constellation of Cancer which lies between Gemini and Leo.

One of the interesting constellations of spring is that small group of four third-magnitude stars known as Corvus, The Crow, forming (Continued on page 208)

COCKROACHES

GREAT-AUNT MARY TELLS ANOTHER STORY ABOUT MEMBERS OF THE "BUG" FAMILY

BY MARY M. CUTTER

THE children had just come in from a ride in the country. Luncheon was being prepared for them, so they urged Great-Aunt Mary to tell "just one story."

"I don't believe you little folks ever saw a cockroach," she started.

"Oh, yes we did—we saw them in Florida, didn't we, Jane?" said Carlyn.

"Well," answered Jane, "they aren't nice bugs and I hope that Cook and Katey will never allow them to come here."

"I will tell you a little about them anyhow," said Great-Aunt Mary. "Since we are learning about 'bugs' we are bound to find some that no one likes. Cockroaches are known by several names—beetles, waterbugs, crotonbugs and other names—but really they are the same old ugly bug all the time. They are regular burglars and do most of their work in the darkness while we are asleep. They hide themselves down behind the plumbing in bathrooms or kitchens during the daytime. They love dark, damp places and places which are not very clean. They eat almost anything and are very destructive. They will eat the glue off stamps and bookbindings, and they particularly love a *red* book and will eat the color right off it. I guess this is because long, long, long ago the little cochineal bug, from which the red coloring comes, was a deadly enemy of the cockroach family. I will show you some books with red bindings which we had when Uncle John and I lived in Bermuda and you will see how they were spoiled by the waterbugs as they were called there."

Jane was sent to bring a book from the table in Great-Aunt Mary's room. The children were greatly interested to find the red cover badly spotted, the color quite gone in places, and the binding almost falling apart for lack of glue.

"I guess those old bugs had a regular party when they found this book in Bermuda. They must have had all their friends come to dinner," said Jane.

"UNCLE JOHN SAID HE WAS PROBABLY GOING OUT WITH HIS BEST GIRL TO A DANCE"

"And I never want them to find my Christmas books," added Junior.

"Cockroaches have six legs and two sets of wings. The outer wings are coarse and the under pair, like little petticoats, are very fine and dainty. Their eyes are close to the ground as though they were always looking for something to steal, and they have two long, jointed feelers which, I suppose, help them to find their way in the darkness.

"The mother bug carries her eggs around in a capsule which trails along behind her and which she hides in some dark corner, perhaps in a fold of clothing in one's bureau drawer. Inside this capsule is a row of little pouches shaped like a cylinder. In each of these pouches is found a single egg. As soon as the eggs hatch the young roaches let out

HERE IS THE AMERICAN COCKROACH, FIRST THE GROWN-UP BUG WITH ITS WINGS SPREAD, THEN THE SAME ONE WITH ITS WINGS FOLDED AND THEN THE YOUNG COCKROACH YOU SEE OFTEN AND WHICH IS KNOWN AS THE NYMPH

a liquid. This softens the cement of their capsule and out they come. The babies are not pretty. In fact, they are white and wriggly things looking like their parents except that they do not have wings. Soon they get their color. Then, after they have shed their skins five times, their wings come and you have a complete cockroach.

"And now," continued Great-Aunt Mary, "there is just time enough left for me to tell you one *funny* thing. In Bermuda the waterbugs were not nearly so repulsive as cockroaches are. They were large and black and shiny like a beetle, and they hid during the day in the clean white sand in the yard. But at night they all came forth in search of food, and, maybe, for exercise. Well, one night when Uncle John and I went to our room and snapped on the light we saw a big shiny black fellow sitting right on top of the pincushion on the dresser. He looked for all the world as though he were fixing himself up in front of the mirror. Uncle John said he was probably brushing his whiskers in anticipation of the evening's concert or was going out with his best girl to a dance. He disappeared in a hurry, and so must we—to lunch."

• • •

THE SHORE ROAD

BY FLORENCE H. MOORE

Winds are calling from the bay—
"Oh, do come and let us play;"
Sea gulls airily are dipping,
While the little leaves are skipping
Down the winding Shore Road.

Two playful sea gulls on the bay—
Chased a cloud one summer day;
Though quite far they may be roaming,
You are sure to see them homing
Back to the Shore Road.

PUZZLE: Find the two sea gulls, Bobbie and Bootsie dog.

GARDENS AND GARDENING

Edited by
ROMAINE B. WARE

Somewhere I have read: "February and March are the months we read and talk about gardening, but April is the month we want to do something about it." We dream and plan of the garden that is to be, picture the new things to be planted, anticipating the joy and suspense of their blooming for the first time in our borders. Many far-sighted gardeners already have their seeds growing indoors, and, even this early, are experiencing thrills as tender leaves unfold and tiny branches put forth.

If you have not already ordered your seeds there is not a moment to lose. Get the seed catalog out at once and send the order today. If you failed to receive any seed catalogs, send for them immediately; post cards will do the trick and the pages of NATURE MAGAZINE suggest worthwhile seedsmen. In Nature's garden, the great outdoors, things are already growing. Fall-planted bulbs are blooming; in some sections, fruit trees are in blossom and everywhere there are signs of life. Spring keeps her promise, birds are returning, the frogs in the hollow send forth their cheerful message, bees and beetles are astir and gardeners everywhere should be up and doing.

Spring is preëminently planting time. With everything awakening, buds and blossoms swelling, we picture our gardens as we would like them to be in the months to come. But if you would make your dreams come true, you must do some planting. Every year something new and different should be added to the garden. No really worth-while garden goes along year after year without some additions and replacements. Improved varieties of almost everything in the line of flowers and shrubs are being developed all the time. Twelve years ago, while living in the middle west, I had quite a fine garden and, among other things, more than a hundred varieties of named irises. In checking the catalog of one of the modern iris specialists today, not a single one of those I treasured so much was to be found. Hundreds of new and vastly improved kinds made up the list.

Irises, especially the new ones, are among the most beautiful and satisfactory of the late spring flowers. Few flowers exceed them for mass color effect in the garden. They are preëminent in range of color and ease of growth. I have selected a dozen and a half which are worthy of any garden. Check them up in the catalogs of some of the iris specialists. You may find some variation of prices under present conditions as stocks on hand vary greatly. Here's the list, every one good—Amber, Aphrodite, Bruno, Candlelight, Citronella, Coppersmith, Duke of Bedford, Folkwang, Germaine Perthuis, Mary Barnett, Midgard, Moonlight, Mrs. Marion Cran, Santa Barbara, Souv. de Loetitia Michaud, True Delight, Vesper Gold and Wedgewood. Better plan to add at least a few of these this spring.

When azaleas bloom this spring, do not fail to have some in your garden. Then new Kaempferi hybrids in many shades of rose, pink and red are among the most beauti-

(Continued on page 199)

DRICONURE
Dehydrated Cow Manure and PEAT MOSS Soil Improver
TRADE MARK REG. U.S. PAT. OFF.

An inexpensive, productive fertilizer . . . Soil Conditioner

Designed to meet the economy requirements of 1933

AFTER decades of trial and testing, cow manure is still recognized as the best garden fertilizer—and DRICONURE *is* cow manure (plus peat moss humus) dehydrated, concentrated, refined.

DRICONURE brings to your soil all the virgin strength of manure. In this concentrated form it contains 15 to 20 times more food value than common barnyard manure. It is clean, odorless and easy to apply. It is absolutely free of weed seeds, litter and other impurities.

What vitamins are to food, DRICONURE is to soils—a power that produces strong, sturdy lawns and lovely, colorful flowers.

And in line with the economy requirements of 1933, you will find that the price of this combined soil conditioner and productive fertilizer will also suit your pocketbook.

If your dealer does not sell DRICONURE send your order direct to us. We will arrange to have it delivered to you by our nearest distributor. $3.00 per 3½ bushel bag, delivered. . . . $75.00 per ton, freight or cartage extra. . . . 10-quart trial package, 65 cents, postage paid. . . .

SORBEX— a finely granulated moss peat for humus or as a carrier for concentrated fertilizers. Sorbex is exceptionally good for rejuvenating worn-out lawns, particularly where you must build from the top without remaking. It carries the health-building humus quickly down to the grass root area without waste.

GPM PEAT MOSS— Not so finely granulated as Sorbex, but better for improving the physical condition of general garden soil. Helps to improve fertility by maintaining moisture constancy within the plant root area. Gives body to sand, breaks up clay. Unexcelled as Summer mulch to conserve moisture and eliminate weeding. The leading brand of all peat moss. Ask for it by name. Look for the green ends on each bale.

Complete information gladly furnished

ATKINS & DURBROW, INC.

165-G John Street , , , New York, N. Y.

Report of Committee on Bird Protection of the American Ornithologists' Union

The American Ornithologists' Union, an organization of world-wide representation, is naturally interested in the protection of birds and has a committee active in this field. Following is its latest report, and the resolution that was adopted at the 50th annual meeting of the Society, held in Quebec, Canada, October 17-20, 1932:

Your Committee on Bird Protection has continued studies of trends and factors affecting adversely the status of birds and has actively championed measures providing better protection for them. Three meetings were held in Washington during the year: March 20, May 5, and October 5. We have considered carefully the resolution concerning the use of poison which was referred to us by vote of the Union at the Detroit meeting last year. Because we have found ourselves unable to adopt and recommend it in precisely the language in which it is drawn, we have prepared a resolution bearing upon the matter, which we shall offer in lieu thereof.

Nothing has occurred to change our belief in the platform of the committee accepted by the Union at the annual meeting in 1930. The need for adherence to the ideals there expressed is evident with every problem confronting the committee at this time. We feel that no agency of deliberate and conscious destruction of birds should be continued, nor any new agency brought into exercise, until an indisputable justification for it appears.

We regret to report that economic depression has had its effect on the educational movement for bird protection. In many States, economic distress has resulted in the discharge of special teachers, thus reducing the number of those teaching Nature study. As an example, the Nature-study department of the Los Angeles City School system was abolished. Under present conditions, protests are of no avail. This setback is partially compensated by the fine series of new volumes on birds which have appeared during the year: "Birds of Minnesota," "Birds of Oklahoma," "Florida Bird Life," "Portraits of New England Birds," and "Birds of Newfoundland and Labrador."

Recent reports from California indicate that two rare birds, the Condor and the White-tailed Kite, continue near the vanishing point in spite of special protection afforded them. The status of the Trumpeter Swan as a breeding bird in the United States continues to show improvement as evidenced by reports from Yellowstone National Park and vicinity.

When the committee's attention was drawn to plans for larger importations of Flamingos from Cuba, letters were immediately written to forestall commercialization of a dwindling species. It is felt that this quick action showing opposition resulted in reduced shipments to New York, and to Florida where there has been talk of reintroduction experiments.

At least two western States have advertised competitive campaigns of destruction of hawks as an avowed protection of game, giving convincing evidence that these beneficial birds are still sought out and killed wholesale. The Province of Ontario has removed all protection for predatory birds. Though much has been written in their defense, and active opposition to such campaigns and such legislation has been voiced by bird students, yet most of the predatory birds continue to be in grave danger. Recent food habit studies of hawks and owls by the Baldwin Research Laboratories have shown that poultry and game constitute less than five per cent of the food of hawks and owls of Ohio. Other studies of similar nature continue to show that a scientific valuation of the worth of predatory birds results in positive rather than negative appraisal. It is a pleasure to report, therefore, that a Hawk and Owl Society has been formed actively to espouse the cause of protection for these birds. This new conservation group has outlined its views as follows:

1. Through educational methods, to create greater popular appreciation of the esthetic, scientific, and economic value of hawks and owls.

2. To combat the constant propaganda which encourages the destruction of all birds of prey.

3. To work for the enactment and enforcement of laws giving adequate protection to hawks and owls.

With these tenets this committee agrees and therefore urges active support of this project.

It is a pleasure to report also that South Carolina gave protection to the Bald Eagle, and at least two States (New York and Massachusetts) introduced bills into their legislatures giving added protection to eagles and hawks. The coming year is one when some forty legislatures will be in session, and the opportunity to initiate better protective laws should not be lost.

Attention is invited to a resolution passed by the Advisory Board to the Secretary of Agriculture which, if carried out, should mean better protection for migratory wildfowl. After naming the chief elements essential to the preservation of migratory game birds as: enactment of restrictive laws, the establishment and maintenance of numerous sanctuaries, and the education of the shooting public to the need of restraint, the resolution says: "It shall be our policy in recommending shooting regulations to give the bird rather than the hunter the benefit of any doubt." However, from a conservationist's viewpoint, wildfowl, considering their present status, are still endangered by insufficient protection. The total protection given this year to two additional species of ducks (Ruddy Duck and Bufflehead) shows recognition of a waning supply. We therefore call upon all concerned to place such limits upon shooting seasons, shooting areas, and game bags, and to take such steps in law enforcement as shall allow water fowl not merely to maintain a doubtful and uncertain status but to insure a safe margin of increase. To this end the committee takes a definite stand favoring legislation to do away with the employment of bait to attract game birds within shooting range and the employment of live decoys for the same purpose, on the ground that these methods are among those most detrimental at the present time to the safety of migratory birds.

On the same account and to the same end, we commend the policy of acquisition by government and altruistic agencies of breeding grounds, rest grounds, and refuges, and of restoring to native condition areas that have been unwisely drained and deforested.

Likewise we commend the efforts that are being made to remedy the evils of stream pollution and the fouling of waters with waste oil.

Respectfully submitted,

H. C. Bryant, *Chairman;* A. C. Bent, Hoyes Lloyd, W. E. Saunders, Florence M. Bailey, B. H. Christy, E. A. Preble.

Resolution Proposed by Bird Protection Committee and Adopted by the Union

The American Ornithologists' Union, upon the recommendation of its Bird Protection Committee, resolves that it desires the preservation and maintenance of the avifauna of this continent, and of all continents, in the largest measure of integrity, and offers the spirit of that pronouncement as the proper one in which to approach all questions of law and practice which concern bird life.

Therefore it deplores every program of bird destruction or control, so called, which is formulated in the interest of and according to the desires of some fraction of mankind, without due consideration of the interests and desires of mankind in general.

It is evident that there is great destruction of birds and of particular kinds of birds, without regard to the status of the species and their ability to endure such destruction, and without regard to the indirect but far-reaching results of such destruction. Specifically, attention is called to the destruction, at the instance of sportsmen and with the mistaken idea of benefiting game, of hawks and owls, and in less measure, of herons, kingfishers, and various other kinds of birds.

The committee disapproves any and all measures of control that by means of poison, traps, or otherwise, accomplish the destruction of species other than those intended. It disapproves the use of steel traps and of traps of all sorts whose use involves the holding of a bird victim for a prolonged period in an injured condition.

It calls for wider and clearer recognition of the fact that birds as a class are of inestimable value to mankind; that civilized society in countless ways bears already too heavily upon these valuable creatures, and that the need is for protection rather than for destruction; and it therefore calls upon all good citizens to favor the establishment and maintenance of sanctuaries; to have no part in such unlawful practices as the sale of game birds; and to support all worthy efforts for bird protection.

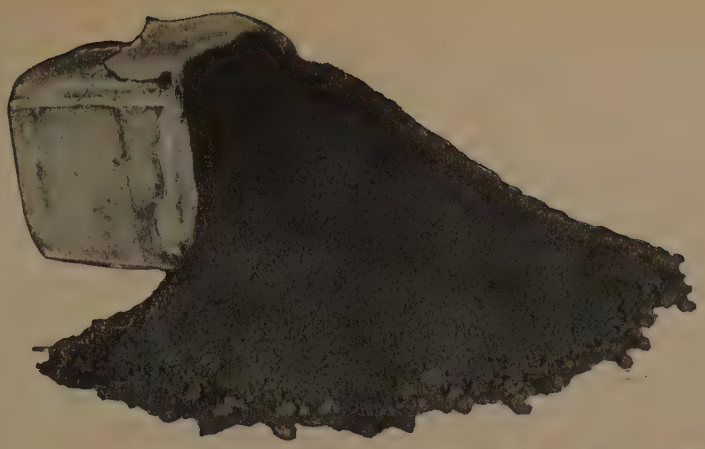
(Continued from page 197)

and satisfactory of the evergreen shrubs, ecially if among or in front of a back- und of evergreens. Since the Federal rantine stopped all imports a few years , all kinds of broad-leaved evergreens e been very scarce and high in price. w they are being propagated in this ntry and may be purchased quite rea- ably. They may be had in full bud, al- dy to open up in your garden. Azaleas, nted in good soil in which plenty of verized peat moss has been thoroughly ed to make it acid, will be a glorious ure of your garden for years to come. ome varieties of flowers, though useful the garden, are primarily most desirable cutting. Gladioli are in this class and rally millions of them are grown today. ey come in hundreds of varieties, a glo- us range of color and a wide variation flower types. Glads are flowers for rybody. Several hundred may be planted a small place and with reasonable care y multiply and stay with you for years. Many of the growers offer bulbs not y in large sizes but in small and medium es, too. They are numbered one, two, ee and so on. Number ones, the largest, t the most, and should be used for the st exhibition size blooms. For average den and cut flower purposes, number ee bulbs are remarkably satisfactory and erally cost about half the price of num- ones. You will be well repaid by send- for the lists of several growers. The ter new kinds of glads are worthy of ry garden, and at the prices they are ered today everyone can plant them.

One of the greatest joys of gardening is icipation. We read the alluring descriptions this or that and, after planting it in the den, watch day by day until it finally un- ds in all its glory, sometimes even more fect than we expected. Roses are like t and now is the time to plant them. Roses y be bought very reasonably this year, n to the finest field grown, two-year-old nts in the best dormant condition. Un- the middle of April dormant roses are erally considered most desirable. Plan add a bed of new roses, say three by feet; this will hold about fifteen hybrid roses of the ever-blooming kinds. From growers' lists you can select according your own tastes or purchase a collection. put up today by the better growers, col- tions are generally "good buys." You ll find the present-day catalogs of many wers to be veritable manuals on plant wing, worthy of preservation and study. Among the hosts of gadgets offered the dener, a set of glass seed-planting tubes led "Plantaseed" have just reached my sk. They look like a clever idea. With se you can not only scatter seeds as de- ed, but see all the time just what remains be sown. Another aid to good gardening a book, "Insects and their Control," by drew Wilson. Three hundred seventy- e pages, profusely illustrated, it covers ery phase of this important subject in n-technical language. It is a book worthy a place in the garden library.

Clip privet and boxwood hedges just be- e growth starts for best results. Prune e blooming shrubs at once, also all roses cept climbers. Shrubs blooming upon last

(Continued on page 201)



PEAT MOSS

Makes poor soil good— and good soil better

What Peat Moss Is

PERHAPS you have never heard of peat moss. Or possibly, if you have, the word doesn't mean anything very definite.

Peat moss is a particular kind of peat. As peats are named according to botanical composition it might even more correctly be called "moss peat" rather than peat moss; because it is a type of peat which was formed from various mosses. Moss peat is indeed descriptive and does clearly distinguish it from other types or different grades of peat —often erroneously called and often sold as peat moss.

Peat is found in all countries. And yet, the particular types of peat moss, properly prepared and perfectly adaptable to garden use, come to us, at present, only from Germany and Holland. It might rightfully be termed "decayed vegetable matter" or "humus", in a state of arrested decay—a source of organic matter that is distinctly out of the class of just "humus". A soil improver free from weed seeds, highly absorbent and retentive of moisture, rich in carbonaceous matter, and free from harmful mineral content—combined advantages found in no other soil improver.

What Peat Moss Does for You

Peat moss will prepare any soil for garden purposes and will improve the best growing soil, both physically and in fertility. It breaks up and renders more friable heavy clay soils. It binds and gives more body to loose sandy soil. It assures constancy of moisture about the plant root level at all times. It acts as a reservoir for plant food applied in a form of commercial fertilizer.

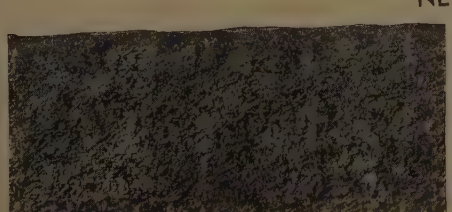
Peat moss used as a Summer mulch does away with the back-breaking toil of weeding and cultivating . . . adds a touch of freshness and newness to every part of the garden. No other one material available for garden use will do for the garden one half the things which peat moss does.

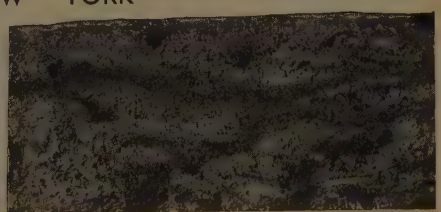
If you have never used peat moss, a delightful experience awaits you. You will find it so different from anything else you might have used. You may use it liberally, confident of good results. Your garden will be one for you to take pride in—for all to admire. Don't deny yourself this pleasure—this safety. It is folly to be ever tempted to employ a "bargain" substitute.

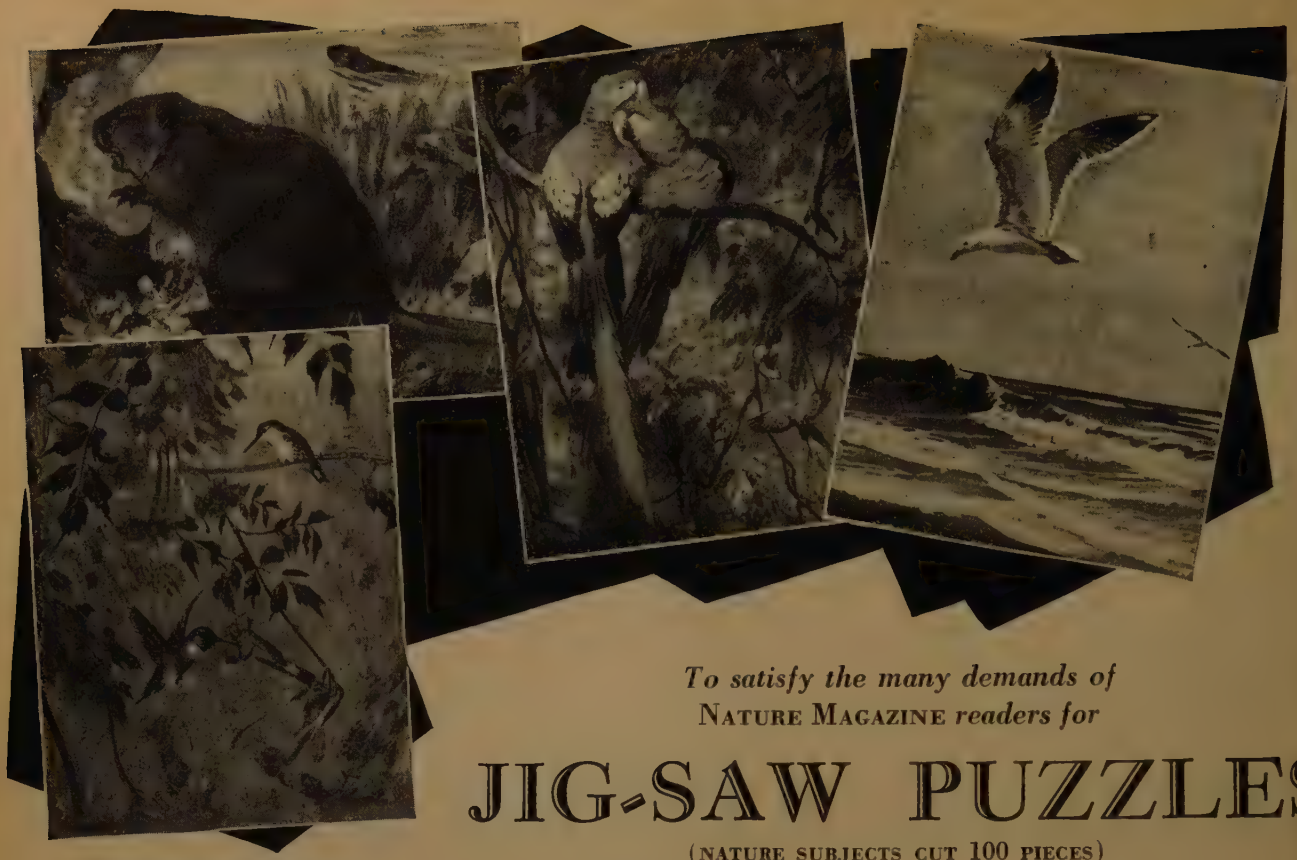
Why not, at this time, consider peat moss as a garden aid? Your dealer will be glad to tell you more about this soil improver and will gladly recommend how much peat moss you should use for your particular type of soil. We, too, offer to lend our aid.

Left cut shows fine, new growth moss peat from which our product is taken. Right cut shows coarse peat, from which undesirable peat moss is taken.

Edu., Adv. & Research Dept.
PEAT IMPORT CORPORATION
NEW YORK
Quality German and Holland Peat Moss







Nature Paintings

To satisfy the many demands of
NATURE MAGAZINE *readers for*

JIG-SAW PUZZLES

(NATURE SUBJECTS CUT 100 PIECES)

The Association has had made up a group of four selected Nature subjects

THE AMERICAN BEAVER : THE WESTERN GULL
THE RED AND YELLOW AND BLUE MACAW
THE RUBY THROATED HUMMING BIRD

Three-Ply Wood

These are not ordinary pictures, but reproductions in full color of paintings by the famous Nature Artist, R. Bruce Horsfall.

The puzzles are *manufactured from three-ply durable wood.* They can be used over and over again without damage to the 100 pieces into which each puzzle is cut.

The *pieces interlock* so that they do not become separated by jarring of the table when being put together. The pictures can be held intact when completely assembled.

Pieces interlock

FUN FOR THE YOUNGSTERS
REAL DIVERSION FOR THE GROWN UPS

$1.00 each, or ALL FOUR for $3.00

Packed flat in suitable mailing box.

Send Your Order Today

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St., N. W., Washington, D. C.

I enclose $—— for which send me the following JIG-SAW PUZZLES. (Check puzzles desired.)

- ☐ Complete set of Four Puzzles $3.00
- ☐ The American Beaver $1.00
- ☐ The Western Gull $1.00
- ☐ The Red and Yellow and Blue Macaw $1.00
- ☐ The Ruby Throated Humming Bird $1.00

Name .....

Street and No. .....

City and State .....

Head Tall DELPHINIUMS

Reg. U. S. Pat. Off.

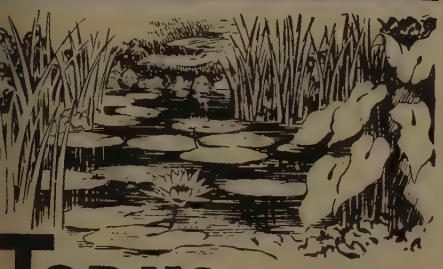
STRAIGHT from England's famous gardens come our finest varieties. Some as high as your head. Great sturdy stalks crowded with blooms in colors unbelievably lovely.

Send for new catalog. Get full advantage of all its thoroughly tested new hardy plants and rock plants.

You'll soon see why experienced gardeners "swear by Wayside."

Wayside Gardens

AMERICA'S FINEST PLANTS AND BULBS
38 Mentor Ave. Mentor, Ohio
Owners: Elmer H. Schultz and J. J. Grullemans



TODAY is the right time to start your water garden. If you have grown water lilies you'll want some new varieties . . . *if not, your greatest gardening thrill awaits you.* Write for our big new catalog containing full instructions. FREE east of Rockies, in far west enclose 15 cents, Canada 20 cents.

$4

Our Most Popular Collection #20
Pink Opal—*Dark Pink,* especially good for cut flowers
Marliac White—A free blooming *Pure White*
Helen Fowler—A popular sweet-scented *Pink*
Marliac Chromatella—A free blooming *Yellow*

Here is a good assortment for your first small water garden. Order *now.* Plant as soon as you get them

THREE SPRINGS FISHERIES
41 N. Court St., Frederick, Maryland

WATER LILIES
ROCK GARDEN PLANTS
FANCY and TROPICAL FISHES

We will tell you how to beautify your yard inexpensively. Charming effects at little cost. Write today for our free illustrated catalog.

BUSKIRK'S AQUARIUM
Box 342 • Independence, Ohio

At Last!

A Good Mole Trap!

$2 EACH and worth it!

The ACME MOLE TRAP is small, easily set, rust-proof and absolutely sure

From Dealers or Direct
C. E. GRELLE, Portland, Ore.

Eastern Representative
ACME SALES CO., Bridgeton, N. J.

Free Circular M—"MOLES and How to Control Them"

year's wood, such as lilac, spiraea and others, must not be pruned until just after flowering; then it should be done promptly. Start spraying such things as phlox, hollyhocks and delphinium with bordeaux just as soon as growth starts. Be sure to drench every surface of leaf and stem to prevent fungus diseases, such as rust and blight, from getting a hold. Clean cultivation together with adequate and regular spraying will do much to forestall serious injury.

One of the large fertilizer dealers is offering a most unique and useful little device called "My Garden Treasure Box." It consists of a small filing box with more than one hundred three by five cards and a complete index. A surprising amount of information is to be found upon these cards, which are printed upon both sides. Mrs. Elizabeth Peterson, executive secretary of the Horticultural Society of New York and a thoroughly informed and experienced gardener, directed the compiling of the information. This device will be welcomed by thousands of gardeners because not only will its information be referred to repeatedly, but it is an ideal foundation upon which the gardener can make up his own card file. Such a file, with its fine index, can take the place of a scrapbook for countless bits of information. Back numbers of magazines can be indexed in it and many other references noted.

While talking with Warren W. Maytrott, amiable president of the American Dahlia Society, the other day, I asked him to suggest a short list of good dahlias costing not more than a dollar apiece. I suggested that they should be fool-proof kinds that anybody could grow in almost any section of the country. He listed the following ten, but said that Edna Ferber, glistening coral of immense size, sometimes disappoints in heavy soils. Here is the list. You will find a goodly range of color and type—Edna Ferber, Fort Monmouth, Golden Sonne, Ida Perkins, Jane Cowl, Jersey's Beauty, Kentucky, King Midas, Old Hickory and Treasure Island.

If you wish to spend real money and get some of the newest novelties, try Amelia Earhart, Full Moon, Monmouth General, Pot o' Gold and Jerome Kern. These seem to be among the most popular of the new dahlias. Miniature dahlias are fast finding themselves in the popular class. A lot of them are quality flowers, reasonable in price, and they have wonderful possibilities both in the garden and for cutting. Rhoda, a buttercup-yellow shading to russet-orange; Pink Pearl, rose-pink with golden eye, and Raider, a violet-rose suffused yellow, are good ones. Tiny is a low-growing, spreading type, seldom exceeding a foot to eighteen inches in height, and has even been used successfully in rock gardens.

Don't fail to try some of the fine new early-flowering chrysanthemums. Masses of 'mums blooming from mid-August until frost are welcome in every garden. Aladdin, September Queen, Donald Wells, Early Bronze, Daybreak and Barbara Cumming are among the best of this early-flowering type. Most of them may be bought at from twenty-five cents to a dollar a plant, and once you have a variety established in your garden, additional plants are easily propagated.

Fall planting of deciduous trees and shrubs should be completed as soon as possible, but there is no hurry about evergreens, because, being moved with balls of

Here's an Amazing Introductory Offer

Now you can reforest waste land for almost nothing. Grow Christmas trees for tubs or cutting. We ship by parcel post to any place east of the Mississippi River.

100 Evergreens Guaranteed $3.50

Every tree guaranteed to live for a year, or replaced free of cost. Orders must be in even hundreds, but you can take 25 each of four kinds.

Norway Spruce — Colorado Spruce
White Spruce — Balsam Fir
Red Pine — Englemann Spruce
White Cedar — Mugho Pine

All trees 8 to 12 inches high, once transplanted. Not less than 25 trees of one kind, nor less than 100 total, sold at this price. Remember, 100 trees for $3.25 cash with order, postpaid east of Mississippi River.

Kelsey Nursery Service
50 Church St. New York City

Quality Gardens

IRIS CATALOGUE contains the best list of Iris ever offered. 10 full page color plates, many half tones and a list of Iris combinations, carefully tested for height, time of bloom and color harmony, make it worth many times the small price of $.35, which may be deducted from an order. Reserve your copy now, as a limited number are printed.

QUALITY GARDENS, Freeport, Ill.

free Burpee's 1933 Garden Book

World's greatest garden guide. Describes all best flowers and vegetables. 152 new varieties. Many pictures. Valuable planting information. Low prices. Sow Burpee's guaranteed seeds—famous for 58 years. Write today for free Garden Book.
W. ATLEE BURPEE CO.
115 Burpee Bldg., Philadelphia

Observe, Collect, and Study Plants, Animals, and Rocks

under experienced leadership and with the best facilities for field, laboratory, and library work while living in an invigorating climate with congenial associates

July 5 to August 24, 1933

The Allegany School of Natural History

The summer School in the Forest
Quaker Bridge, New York

Seventh season of a new type of school, based on the best educational principles, and offering college credit. A splendid school for teachers of Biology, General Science, Physical Geography, or Nature Study.

For information write
DR. ROBERT B. GORDON
Ohio State University Columbus, Ohio

FOR EVERY GARDENER

Whether your interest is in roses or rock gardens, the greenhouse or the vegetable patch, you will find expert advice in every issue of the Gardeners' Chronicle, America's outstanding all-gardening magazine. Practical, reliable and timely, it costs only 25c a copy or $2.00 by the year. Six months' thrift subscription, $1.00.

GARDENERS' CHRONICLE

522-U Fifth Ave., New York City

2 Pyramidal Arborvitaes, 2 Austrian Pine, 2 White Spruce, 2 Japanese Cypress
7-to-8-year-old trees, 1 to 1½ feet. Suitable for foundation planting. A Genuine Bargain.

Colorado Blue Spruce
8- to 9-years, sheared, 15- to 18-inch, each $1.10
6-year-old, 8- to 10-inch.....4 for $1.10

10 JAPANESE BARBERRY, 3-year-old, heavy and well branched, special..... **$1.20**
3 RHODODENDRON, 1 to 1½ feet, Pink, Red, Purple, Big value..... **$1.25**
2 Nikko True-Blue HYDRANGEAS Hardy, Blooming Size, only..... **$1.10**
6 Assorted Rockery Evergreens..... $1.50
12 Hardy Lupines, mixed..... $1.20
5 1933 Novelty Fragrant Pink Violets.... $1.20
12 Rock Garden Plants, assorted..... $1.20
12 Hardy English Primroses, mixed..... $1.20
10 Red Delphinium, novelty..... $1.20
12 Hardy Blue Salvia Azurea..... $1.20
12 Hybrid Oriental Poppies..... $1.20
2 Azalea Mollis, deep orange, bloom. size $1.10

12 Japanese Exhibition CHRYSANTHEMUMS **$1.25**
Queen of fall flowers. Blooms 6 to 8 inches wide. Bronze, Yellow, Pink, Rose, White, Lavender.

Add 25c for Packing
NEW MARKET PERENNIAL GARDENS
45 Randolph Road, New Market, N. J.

Franklinia

Gordonia alatamaha
An Exquisite Fall-flowering Tree

Found in Colonial days, lost for 150 years, this exquisite native shrubby tree survives because a neighbor of Franklin sent plants to Philadelphia gardens.

Starred with snowy 3-inch, golden-hearted flowers from August to late fall, when they contrast with brilliant foliage, Franklinia is one of the most unusual plants offered today. Our exhibit at the 1932 Atlantic City Flower Show created a great sensation and won a Gold Medal. Hardy to Boston, Franklinia thrives with rhododendrons and azaleas.

Splendid Plants, $5 each
18 to 24 inches high

Famous Whitesbog Blueberries, Holly, Magnolia glauca, Pine Barren Gentian, Climbing Fern, and other native treasures are available. You may have descriptive folders if you will send your name and address.

JOSEPH J. WHITE, Inc.
P. O. Box 34 Whitesbog, N. J.

TIGRIDIA (Mexican Shell Lily)

Exotic summer-flowering bulbs. Blossoms often 5" across. From July to October. Colors—yellow, rose, and scarlet, mixed. Beautifully marked centers. Ideal for rock gardens. 12 large bulbs—$1.50, prepaid.

BULB SEEDS—Rare Varieties—Agapanthus, Alstroemeria, Cyclamen, Hyacinthus, Wild Gladiolus, Iris, Lilium, Watsonias, 25c pkt.

LIST OF RARE BULBS and BULB SEEDS sent FREE on request.

GORDON AINSLEY, Campbell, California.

soil, they may be handled just as well a little later. Add a Beauty Bush (Kolkwitzia), one of the most beautiful of the new shrubs with its lovely pink bell-shaped flowers with orange throats. Be sure to prune back, at least a third, all deciduous shrubs set out this spring. Do not fear you will injure them by cutting back; the great danger is in not cutting them. Watch out that tiny plants in seed beds do not crowd themselves to death. Transplant them promptly, allowing room to develop; pinch back the tips of those getting too tall and keep them growing vigorously all the while. Fresh air, sunlight and regular watering are vitally important to seedlings. Good gardening is working with Nature, helping her to achieve the best results.

NOTE—The Garden Department of NATURE MAGAZINE is maintained to help you solve your problems. An extensive reference library and information file is at your service to answer the multitudinous questions upon gardening and landscaping the home grounds. Write us of your problems, tell us of your successes. Let us help you to make better gardens, to find better plant varieties, to get more joy and satisfaction from your garden.

GARDEN BOOK MART

NATURE MAGAZINE'S Garden Book Mart offers to readers conscientious advice upon garden books and prompt service in supplying them. This Department will be glad to answer inquiries, advise upon selections or locate for you any garden book published. Here are four we fully recommend:

HARDY EVERGREENS—$1.40 postpaid.

If this book were read only for its advice upon pruning, it would be worth many times its cost. Almost every phase of evergreen care, as well as suggestions upon varieties for varied uses, are covered in this little volume. It is a practical handbook the back-yard amateur will find useful throughout all his gardening years.

A SIMPLE GUIDE TO ROCK GARDENING—$1.40 postpaid.

This book, although written in the simplest of terms, is by no means a volume for those half-heartedly fussing with so-called rock gardening. It is for the amateur who is really in earnest and wants to have a genuine rock garden patterned after Nature's finest examples. It is not a large book, only 126 pages, but it is well and understandingly written by an Englishman who "knows his rock gardens." Unlike most books by English writers, this fits our American conditions quite well. If you want to follow the best practice and build a rock garden you will be proud of, a study of this book will help you.

THE BOOK OF TREES—$3.15 postpaid.

This is more than just another garden book. Professor Hottes, the author, has drawn together in this book not only descriptive and cultural facts for almost all our varieties of trees, but a wealth of interesting and entertaining information as well. Among others there are chapters upon Trees of American History, Tree Poems, Trees for Many Uses, Pruning, Feeding, Tree Repairing, Propagating and others. It is well illustrated throughout and ends with a complete index, a feature much appre-

EVERGREENS

100 TREES
Delivered Prepaid $3.98
10 Varieties—
2 to 5 Years . . . .

Strong, well-rooted, nursery-grown little trees, ranging in height from 6 in. to 24 in., according to variety and age. Same collection sold last spring at $8.50, now for limited time, only $3.98.
10 Silver Fir; 10 Virginia Juniper (Red Cedar); 10 European Larch; 10 White Spruce; 10 Blue Spruce; 10 Norway Spruce; 10 Mugho Pine, dwarf; 10 Japanese Red Pine; 10 Austrian Pine; 10 Red Pine. 100 Trees in all.
Send money order or check today for $3.98. If west of Miss. River, add 25c for extra postage. We will ship by prepaid parcel post.

WILMACO GARDENS
330 Woodridge St. Manchester, Conn.

Grow GLADS

MAKE your garden the envy of you friends with Gove's Sturdy Ver mont Glads. Best of garden cut flower —very easy to grow. Our special "ge acquainted" offers will make you enthusiastic "glad fan". Bulbs sure to bloom first year.

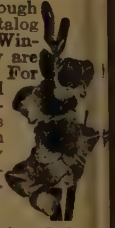
100 Large Healthy Vermont Bulbs $3

This collection includes at least 40 fine varieties in many shades of Red, Yellow, Pink, Blue Orange, Smoke, White, all fine ones but no labeled as to name. **50 for $1.75.** *All* s *prepaid* with complete instructions for growing prize-winners. I believe this to be the fines "glad" collection offered anywhere.

Send for beautiful illustrated catalog "that is different," listing over 300 of the world's best varieties.

CHAMPLAIN VIEW GARDENS
ELMER E. GOVE
Box E-10 Burlington, Vermont

KUNDERD'S New Gladiolus



Winners again in 1932. A glance through Kunderd's beautifully illustrated Catalog will show that Kunderd's Sweepstake Winners of the National Gladiolus Show are now available at amazingly low prices. For many years, customers have experienced that the Largest, Finest and Most Beautiful Blooms are obtained from bulbs secured from Kunderd direct. The reason is that Kunderd bulbs are scientifically grown and cured, and produce finest results. We will gladly send you our Catalog Free. Please use the coupon.

A. E. KUNDERD, 332 Lincoln Way W., Goshen, Ind.
Please send me Kunderd's Gladiolus Book for 1933—FREE!
Name.....
Street or R. F. D. .....
City.....State.....

AMERICAN IRIS

Have you seen any of our beautiful Native Iris yet? Of wonderful colors not found in any other Iris, gorgeous brick reds, pure whites, mauves, black purples, cerises, yellows, light blues, pinks, and many blends. From two-inch Dwarfs to seven-foot Louisiana Giants, Giganticoerulea, etc. From Alaska, Canada, and twenty states. Hardy and easy to grow, blooming with Japanese Iris; a wonderful new Novelty.

Special Cash Offer for Spring Delivery

1 Fulva, brick red, 1 Snow Queen, pure white, 1 Pseudacorus, golden yellow, only **$1.00**
With 1 Giganticoerulea, giant blue, **$2.00**

Free Illustrated 48-page catalog offering all the finest Bearded Iris, Standard and Novelties, and many rare, beautiful species.

ROYAL IRIS GARDENS
J. C. Nicholls, Jr. Camillus, N. Y.

Plant for Pleasure
Not for Pests
When you see Aphis (plant lice) or similar insects, act quickly. Spray "Black Leaf 40"
The Gardener's Friend
For 20 years "Black Leaf 40" has waged successful war against insects. Endorsed by professionals. Double-action—kills by contact and fumes. A little goes a long way—one or two teaspoonfuls to a gallon of water. Also protects against nuisance by dogs or cats when sprayed on shrubs and bushes. Sold everywhere. Send for free spray chart.
TOBACCO BY-PRODUCTS & CHEMICAL CORP., Incorporated
Louisville, Ky.
"Black Leaf 40"
3345

DAHLIAS
POTASH-FED

8 EXHIBITION DAHLIA ROOTS $4
(Value $7.50)

8 Exhibition Dahlia Plants $2.75 (Value $3.75)
Eight prize winning, Potash-Fed Dahlias, all different, delivered postpaid, for less than half the introduction price of one variety. All labeled and fully guaranteed.

City of Trenton — Ida Perkins
Glory of Monmouth — Kentucky
Kemp's Violet Wonder — Old Hickory
Dr. John Carman — Waldheim Sunshine

Our FREE 1933 Catalogue
is keeping with past years is distinctly different, contains planting and cultural instructions, is profusely illustrated and lists most of the new and all the established worthwhile varieties. Write today.

Grow Potash Fed DAHLIAS

DAHLIADEL NURSERIES
W.W. Maytrott Box 65 VINELAND, N.J.

Choose from Our 75 Varieties of
Beautiful
WATER LILIES

hese richly colored, fragrant, sy-to-grow garden flowers may planted from April until the st of August. Ours are the lar-st Aquatic Gardens in Amer-a. Every root *guaranteed!* 75 beautiful Varieties from hich to make your choice in our free, illustrated Cata-g. Send for it NOW.

The W. B. SHAW Aquatic Gardens
ept. A, Kenilworth, Washington, D. C.

Gladiolus Book Free
Send for my new 36-page GLADIOLUS BOOK describing 171 exquisite varieties, many new. Tells how to grow. 45 illustrations. It's free. Write today.
PRICES GREATLY REDUCED!
HOWARD M. GILLET, Gladiolus Specialist
Box 458, New Lebanon, N. Y.

ciated by those seeking specific information.

ANNUALS IN THE GARDEN—$1.40 postpaid.

The merest novice will find this book valuable. Annuals are flowers for the beginner although the experienced gardener would be loath to do without them. Using annuals to the best advantage is little understood and this book will become the aid and partner of gardeners everywhere. It abounds in plans of every description, in lists for every purpose and in cultural directions galore. It is so simply written that the amateur can readily follow its suggestions and still the advanced gardener will find it worth while.

SUGGESTED IN LAST MONTH'S BOOK MART

ALL ABOUT FLOWERING BULBS—$2.15.
GARDEN POOLS—LARGE AND SMALL—$2.65.
HOW TO GROW ROSES—$2.15.
1001 GARDEN QUESTIONS ANSWERED—Cloth, $2.15; paper, $1.65.

Order these books through NATURE MAGAZINE; terms, cash with orders.

LET US SERVE YOU.

Nature School

This August will mark the sixth season of the Allegany School of Natural History—"The School in the Forest"—in Allegany State Park, New York. During this time the school has developed a fine program attracting students in the fields of botany, zoology and geology with emphasis on the natural history aspects. Camp and outdoor leaders find it a boon in their work and in connection with the rapidly increasing development of Nature work in museums, parks and forests. The school is conducted by the Buffalo Society of Natural Sciences in cooperation with the New York State Museum and affiliated with the University of Buffalo. Information may be obtained from any one of these institutions.

Dubuque Naturalists

Members of the Nature Club of the Dubuque, Iowa, Senior High School are to be complimented upon their excellent *Nature Club News*. This is a printed periodical now in its second volume and is brought out monthly with the help of the school Print Shop. The editor is Allan Wendt and the faculty advisor is Ross W. Harris.

COLORFUL WATER LILIES

Everything
FOR THE WATER GARDEN

If you have thought that the colorful beauty, exquisite fragrance and never-ending interest of a Water Garden would be too costly for you to enjoy, we urge you to send for the new 1933 catalog of Wm. Tricker, Inc., the oldest and largest growers of Water Lilies and Aquatic Plants in America today.

In it you will find everything for the water garden, at the lowest prices in our 27 years' experience.

Our new catalog describes and pictures, in natural colors, hardy and tropical Water Lilies and all types of water plants and ornamental fishes. It tells how to construct a pool, how to plant a tub garden, and gives complete cultural directions. Send for your FREE copy right now.

FREE
Beautiful new 1933 Catalog

Wm TRICKER INC.

3410 Brookside Ave., Saddle River, N. J.
3419 Rainbow Terrace Independence, Ohio

BLUE SPRUCE

DWARF MUGHO PINE—
NORWAY SPRUCE—SCOTCH PINE—
WHITE SPRUCE—RED PINE—
6 Inches to 1 Foot Tall

GUARANTEED TO LIVE

60 TREES FOR $3.00 PREPAID

10 EACH OF THESE SIX VARIETIES

All 4 years old, once transplanted. Many Other Varieties and Sizes. Ask for Prices!

WESTERN MAINE FOREST NURSERY
Dept. N33 Fryeburg, Maine

Jacob's Ladder and Joseph's Coat!

No, they're *not* scriptural references; because the first is shown on Page 93 and the second on Page 54 of the 1933 Dreer's Garden Book. And Solomon's Seal is on Page 173!

This "Book of the Year" for amateur gardeners contains not only all the delightfully whimsical flower names you know, but 210 pages of highly authoritative facts. Free in U. S. A. to those interested in vegetable and flower seeds, roses, perennial plants, etc.

HENRY A. DREER
Dept. L-3, 1306 Spring Garden Street, PHILADELPHIA, PA.

DREER'S

EVERGREENS

BEAUTIES for ORNAMENTALS
WINDBREAKS and HEDGES

Sturdy, healthy New Hampshire stock —many times transplanted. All sizes from the smallest twig under glass to fully developed, beautiful trees.

We offer as specials—5 year transplants of
DOUGLAS FIRS—14-22", $3.50 per 100
AMERICAN ARBORVITAE 7-16", $5.00 per 100
CANADIAN HEMLOCK 10-18", $8.00 per 100
COLORADO BLUE SPRUCE 8-12", $9.00 per 100

Prices F.O.B. Keene. Write for complete circular of Evergreen bargains.

KEENE FORESTRY ASSOCIATES
Dept. N Keene, N. H.
27 years an Evergreen Nursery.

CHRYSANTHEMUM
EARLY BRONZE

Our own introduction, is a fine large button variety, hardy, bronze-yellow in color. Blooms about Sept. 15, *early enough to escape hard frosts.* Gardeners and chrysanthemum specialists are enthusiastic over this new variety.
$1.00 for 3 plants (postpaid). Order now.
GRAY & COLE Ward Hill, Mass.

Psyllium Seed

INDIA WHITE { 5 lbs. - - $1.00 / 12 lbs. - - 2.00
FRENCH BLACK { 5 lbs. - - $1.50 / 12 lbs. - - 3.00

Agar-Psyllium . . a comb. of agar, psyllium seed, and dextrin . . a perfect corrector for constipation. { 1 lb. 75 cts. / 5 lbs. $2.50

Agar-agar granular - 1 lb. $2.00
Lactose and dextrin - 5 lbs. 2.50
Cod liver oil - - { 1-2 gallon $1.50 (weight 6 lbs.) / 1 " 2.50 (weight 10 lbs.)

Money-back guarantee. Shipped prepaid within 300 miles of Chicago. Add 5c a lb. for greater distance. Sample for comparison on request.
LAX PRODUCTS CO., Dept. B, 325 W. Ohio St., Chicago

Walsh Garden Tractor
and Power Mower
A Complete Gas-engine Machine for Gardeners, Florists, Fruitmen, Poultrymen & Suburbanites.
Plows, Seeds, Cultivates, Mows Lawns & Hay
Eliminates Hand Work. Does Belt Jobs. Single & Twin engines. Built to walk or ride
NEW LOW PRICE—PAYMENT PLAN
Write for Special Offer—*Catalog Free*
WALSH TRACTOR CO. Minneapolis, Minn. 3324 Talmage Av. 72-L, Murray St. New York, N.Y.

12 GIANT DAHLIAS $2
Postpaid—Choice, named varieties
Each root properly tagged—Including
JANE COWL and JERSEY'S BEAUTY
Bargain Catalog, FREE—150 Varieties
B. K. MATLACK Box B Bridgeton, N. J.

An Iris Lovers' Catalog
The world's most complete, interesting and informing treatise on the modern Iris.
A copy to every Iris lover for the asking
SCHREINER'S IRIS GARDENS
Box 201, Riverview Station, St. Paul, Minn.

GLADIOLUS

4 Souvenir (*Yellow*), 4 Orange Queen (*Orange*), 3 Virginia (*Red*), 3 Purest of All (*White*), 3 Herada (*Lavender*), 3 Osalin (*Pink*). 20 Bulblets as Above
15c *Two Lots for 25c*
100 *Mixed for 50c Postpaid*
Regal Bulb Co., Dept. 317, Westport, Conn.

Double Red Sunflowers
A new plant produced by crossing chrysanthemums and sunflowers. The name—"SUNDALS". The color is a peculiar burnt orange shade, almost black.
Package of 50 seeds 50c
W. L. DAVIS 311 Funke Bldg. Lincoln, Nebraska

DOUBLE NASTURTIUM
Sensational new double, sweet-scented Nasturtium Golden Gleam. Packet 25c; oz. $1.00. Sent postpaid. Write today. Burpee's Garden Book free.
W. ATLEE BURPEE CO., 116 Burpee Bldg., Philadelphia

ANCIENT FLOWERS OF FIELD AND WOOD

(Continued from page 182)

out its fertile stems and bears at their summits the cones or rudimentary flowers. They are fed by food stored the previous summer in the oval bulbs which cling to the deeply-embedded roots. A few warm days serve to ripen the cones and we find them filled with yellow dust. Every gust of wind showers the spores to the earth where they are soon fertilized and made ready to become future Equisetinae.

The club-mosses or Lycopodiums are still other ancient flowers that have come down to us by a battle waged throughout the ages. Some of them resemble diminutive trees and at their summits bear clusters of yellow cones. When we chance to touch them during our autumn journeys they shower our hands and clothing with ochre dust and we realize why the druggist found use for such powder in his commercial enterprises.

The spruce tree of mountain glen and peat bog also bears primitive flowers. Although these are ordinarily spoken of as cones, a detailed study of their form and structure makes us aware that they are only more remote relatives of the lily and the rose. The red spruce bears two sorts of cones. These are at variance in size and each kind is borne on separate branches. The smaller are brown, fragile structures filled with yellow pollen grains, while the larger are somewhat green, tough objects, wherein the ovules or female elements are housed. The pollen-bearers give rise to their showers of dust and then fall from their fastenings. What then happens to the permanent, green cones? Why, they remain for some weeks securely fastened to the spruce boughs, and when their seeds are ripe they are sent far by the winds.

The true status of such flowers is not alone established by the botanist. The student of the rocks, the paleontologist, has thrown much light on them, too; and in the annals of his endeavors, we are enabled to decipher the significance of ancient plants, and peruse the rocks as if they were the pages of a terse story-book.

Scaring Bugs

One summer about twenty years ago when we were living on a farm in Missouri a black and yellow bug not quite as large as a cricket began to eat our potato plants so fast our father knew something would have to be done or we would have no potatoes to eat ourselves. These bugs were so numerous you could scarcely put your finger on a plant without some of them crawling on your arm, making blisters as they went. Father was at his wit's end to know what to do, as farmers in those days did not use chemicals to kill pests as they do now.

Fortunately a friend of our family, Mr. Butler, came to visit us at this time. During the course of the conversation about the weather and crops father told our friend the trouble he was having with potato bugs.

"I think I can tell you how to get rid of them," said Mr. Butler.

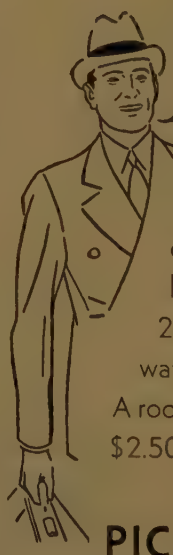
Do snakes sleep?
What bird carries its young like a cat?
Do house flies breed in Alaska?
How did the Morris chair get its name?
What highwayman became chief justice of England?

• These and hundreds of other questions answered interestingly in "Nuggets of Knowledge", "Popular Questions Answered", "Things Worth Knowing".

Three fascinating books by George W. Stimpson. You will find them an ideal present and fun to have on the library table to read at odd moments or to refer to for vexing questions.

TWO DOLLARS EACH
Order from
Book Department
AMERICAN NATURE ASSOCIATION
1214 16th St., Washington, D. C.

I'VE FOUND THE BEST HOTEL VALUE IN NEW YORK CITY



Just think . . . a modern, new hotel, in the heart of New York—200 feet from Broadway on 45th Street. A room and bath for one, $2.50; for two, $3.50.

It's the
PICCADILLY
45th STREET and BROADWAY • NEW YORK
WILLIAM MADLUNG, MNG. DIR.

MIRAKEL
DAYLUX BINOCULAR

POCKET PRISM NATURE GLASSES

3½ power $13 to $18; 5 power $13 to $17; 6 power $16.50 to $20; 7 power $19.50 to $35; 8 power $18.50 to $37.50. Sent on approval, post paid. We carry everything in new and used glasses. Catalogue free. What have you to exchange?

J. Alden Loring Box K-2 Owego, N.Y.

UT YOURSELF A
ECE OF LAKE!

the prow of an Old Town Boat out in a
ed lake. Let the point of it part a pretty
w along the bee-line to your favorite bass-
She glides without a shiver . . . gets you
in a wink. For Old Town Boats are built
nife the water at a speedy clip . . . light,
to handle . . . reinforced for powerful out-
d motors. Sturdy and steady and trouble-free.
hether water is choppy or glassy-smooth, an
Town glides on an even keel . . . banks
tifully on the turns. Get a free catalog.
the many models for every use. Sporting
s. Big, fast, all-wood seaworthy types for
ily use. All kinds of canoes; rowboats; din-
s. Lower prices. Write today. Old Town
oe Co., 484 Main St., Old Town, Maine.

Old Town Boats"

ature's Magnificent Spectacle

The Breath-Taking Panorama of
Sea and Sky Viewed from the
Ocean Deck of THE LUDY

Our Rates begin at $5
Daily per Person
Room with Bath Including Meals

Write or Wire your Reservation

R. B. LUDY, M. D.

OONS. See March issue, page
Entomological Supplies. Riker
ts, insect pins, butterfly nets,
de jars, spreading boards,
men boxes, dissecting sets,
oscopes, breeding cages, etc. Send for complete picture
list. A. Glanz (Naturalist and Taxidermist), 740 New
Ave., Brooklyn, N. Y.

THE TEN-YEAR INDEX
makes
NATURE MAGAZINE
a text-book.
Order yours now.

"How's that?" father asked with great interest.

"I have heard they can be frightened away by loud noises," answered Mr. Butler.

"I am willing to try anything," said father more with the idea of pleasing Mr. Butler than of believing in such a thing.

So the two men discussed the best way to go about making the experiment, and decided to wait until evening when the bugs would be through eating and more apt to notice unusual sounds. In the meantime, we children, who had been interested listeners, gathered together everything we could find to help in making a noise—tin pans, old horns, and big rustling cottonwood branches.

Just before sunset that evening we took our places quietly at the head of the potato rows. There were nine of us—father, mother, Mr. Butler, we three children, and the three hired men—each well equipped to raise bedlam. At a signal given by father pandemonium broke loose. Down the rows pounding our pans, blowing our horns, flourishing our branches we went yelling at the top of our voices.

And those bugs! You ought to have seen them! They gave us an almost human look of frightened astonishment, and down the rows they went, tumbling over one another in their mad haste to make a quick getaway. We pursued them with our frightening din until we chased them into a gully where they disappeared in the tall grass. By that time it was too dark to see where they went to hide, but the next morning as soon as it was light enough we children searched everywhere for those bugs without finding a single one.

And what is more—we were never troubled by potato bugs again!

—LINNIE SHULL

THE GROUSE OF GROS VENTRE

(Continued from page 192)

esque shapes in their battle for life. At one point the cliffs fell away in steep slopes to the waters of the Gros Ventre River. Here, several trails, deeply trodden in the loose soils of the slopes, converged in crossing the hazardous surface of a rocky ravine.

After crossing the river over the "Red-Hill Bridge" the road climbed to a low bench with an irrigated grain field just within a buck-fence to the right. The tops of cone-laden blue spruce and red fir trees, growing on the steep slopes and along the bank, created a screen to stimulate the imagination about the attractions of the quick waters of the river heard above the noise of the throbbing car.

When the car came in sight of the bench, our grouse friend in the grain field was standing on the raised ditch bank, some fifty yards from the road. As soon as it saw the car it came running through the field and under the fence to the road where the car had stopped. Nowhere have I seen a description doing justice to the beauty and pleasing lines in the marking of this bird. The feet alone, with their perfect proportions, little scale webs along the sides of each toe, and the fine growth of protective feathering, were a joy to observe. The white feathers on each side of the lower neck marking the areas distended when making the mating call, the deep

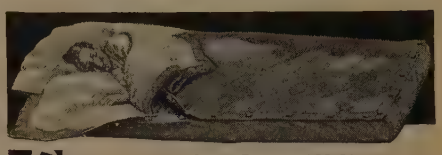
A *put-up job* *that* STAYS *up!*

You can put up a Hodgson Camp House yourself in an hour or two! For it comes in sections, windows and doors ready hung. All you do is bolt it together. No complicated sawing or carpentry. Despite the speed and ease with which a Hodgson Camp House goes up, it is reassuringly permanent. Made of tough red cedar—weatherproof, wind-proof, good for years of service.

Hodgson Camp Houses make ideal vacation places in the mountains or at the seashore. Campers, hunters, fishermen find them particularly attractive. They come with one, two, three or more rooms, with or without an outside porch. Priced, moderately, from $150 up. See them at our permanent displays in New York and Boston. Or write for Catalog CEA-4 to:

E. F. Hodgson Co., 730 Fifth Ave., New York
or 1108 Commonwealth Ave., Boston, Mass.

Hodgson Camp Houses



2 Star, Large, $55.50
2 Star, Medium, $46.50

Sleep—*And How!*
IN YOUR WARM
WOODS
ARCTIC DOWN
SLEEPING ROBE

BETWEEN the dampproof windbreaker cover and the warm wool lining, a thick interlining of soft Woods Everlive Down from Northern waterfowl insulates you both ways. Warmth can't escape—chill can't get in—however cold or stormy outside. Body moisture passes out freely. Ventilation admitted as wanted. Talon hookless or Lift-the-Dot fasteners keep you covered. Head flap makes draw-tape hood when desired. Spring, summer or fall—in tent, cabin or unsheltered open, your Woods Two-Star Sleeping Robe will keep you warm and protected. Satisfaction guaranteed. Get yours from your dealer, or direct with transportation free. Other Woods Sleeping Robes for less. Folder FREE.

WOODS MFG. CO., LTD.
Over 25 Years Makers of Woods Arctic Down Robes
3312 Lake Street, Ogdensburg, N. Y.
In Canada—Ottawa, Ontario

Free Squab Book

Make money breeding PR Royal WK Squabs, cream of poultry, getting double chicken prices. Raised in 4 weeks. *Send four cents stamps* for postage on new free big 68-p book, how to breed and profit 1933. Our 33rd year.

Plymouth Rock Squab Co, 704 H St, Melrose, Mass.

Plant a Seed
exactly where you want it with the
PLANTASEED

Glass, transparent, pocket size, 6" long. Set of 3 (with spouts for small, medium and large seeds) 60c postpaid.

Or send $1.00 and we will include 8 *Attracta* Plant Markers. New!

R. P. CARGILLE
(Dept. A) 26 Cortlandt St. New York, N. Y.

Study Nature

"Nature hath made nothing so base but can read some instruction to the wisest man"—ALEYN.

Nature Camps—conducted by Pennsylvania State College Summer Session—for teachers and naturalists. Picturesquely located in mountains of Central Pennsylvania, where birds and wild animals abound. Study their habits and haunts. Learn, too, the characteristics of rare plants and trees.

FIRST CAMP—June 29 to July 20
SECOND CAMP—July 19 to August 9

Lectures by eminent naturalists

A vacation of fruitful, fascinating study that will bring you into a more intimate knowledge of nature and its myriad wonders.

Illustrated booklet on request

Professor GEORGE R. GREEN
Director of Nature Camps

THE PENNSYLVANIA STATE COLLEGE
State College Pa.

Learn to be a—
LANDSCAPE ARCHITECT
At Home—By Mail

Big fees; pleasant, healthful work; a dignified, uncrowded profession offering remarkable opportunities. Immediate income possible. Many students more than pay for course from fees earned while studying. Graduates are earning $50 to $200 a week. The first step toward success is to write today for details.

AMERICAN LANDSCAPE SCHOOL
Member National Home Study Council
84 Plymouth Bldg., Des Moines, Ia.

Callouses
Gently Fade Away

The torturous pains of Corns and Callouses yield in a few seconds to the wonderful medication in this thin, comfortable adhesive fabric. You walk, play, dance, in comfort. No more nagging pains or tired, aching, burning feet. **Medicated Adhesive Tape** quiets the inflamed nerves and absorbs all hard growths without injury to healthy flesh. Antiseptic, healing. Big spool, 60 square inches. Send $1. and if not satisfied after trying, get full refund.

Comfitape Laboratory, Box 10, Burlington, Vt.

MEDICATED **Comfitape**

CLASS PINS & RINGS

Sil. Plate 15c ea.
Gold Fill 20c ea.
Sterl. Silver 25c ea.
Roll Gold 50c ea.

Ring R3 Sterl. Silver $1.25 each.
10Kt. Gold $3.96.
Catalogue FREE. Prompt and Safe Shipment.
ARTISTIC MEDAL & BADGE CO.
214-216 Greenwich Street New York, N. Y.

25¢ FOR PINS-RINGS $1.25

Class pins—any letters, any year, any colors. Silver plated, 12 or more, 25c each; 1 to 11, 30c. Gold plated, 40c; sterling, 45c. Class rings, medals, etc. BIG CATALOG FREE.

METAL ARTS CO., Inc., Factory 25, Rochester, N.Y.

dusky luster of the eyes, the feathers about the beak and nostrils, the bright yellow comb on each side of the head above the eyes, were some of the features to attract attention.

Yes, it was only a grouse, evidently due for quick destruction by a passing car. Underlying this casual thought there is a deep conviction of the wonder and fineness of this creature, the perfection of millions of years in its completion by the Master. There should be little surprise over the extent of its appeal. Surely such as he have a great future as objects of study and inspiration.

Opposes Motor Road

Holding that it will "endanger the outstanding natural and primitive conditions in the magnificent forest on the crest of the range," the Executive Board of the Izaak Walton League of America has gone on record as opposed to the construction of a motor road following the crest of the Great Smoky Mountains from Newfound Gap to Deals Gap. The Board also urged that as complete information as possible concerning developments in primitive areas within national parks be furnished all organizations interested in the preservation of places of outstanding inspirational or scenic value.

An Eager Listener

At a recent meeting of our Garden Club, we had an unexpected guest in the person of an antiquated, battle-scarred foxterrier. It seemed that he had recently come into the hands of our hostess as a sort of family inheritance. Meeting us at the door with the hostess, he gave us each a welcoming sniff and then passed on with us into the room where the meeting was to be held. Here he took his stand, literally, and continued so during the entire meeting, wearing as serious and interested an expression as any member present!

The worried hostess meantime used every possible persuasion to dislodge him, fearing that he might prove quite demoralizing, but all efforts were in vain! As the meeting progressed, and motions were made on different subjects, before anyone could collect her wits sufficiently to respond, the old terrier would invariably "speak up", with an impressive and decided "Wow", as if seconding the motion! This finally so convulsed the members that the meeting threatened to adjourn ahead of time.

Meanwhile, the distracted hostess became more and more violent in her efforts to dislodge our guest, but he had taken his stand, and there he remained! Now whether his ancient dogship's interest in the meeting was more profound, or his keen olfactories scented "Tea" in the air, I can't say, but at any rate there he remained until its appearance!

He seemed to realize at once that the time for the social hour had arrived, so throwing off his solemn air he became most friendly, going about among the ladies with an ingratiating wag of his tail, when of course he was showered with attentions and good things at every turn! If, by chance, one of the ladies got too busy in conversation to notice his presence, he immediately changed his tactics and would gently but persistently poke her knee with his nose until the good things were forthcoming

10-YEAR INDEX TO NATURE MAGAZINE

NOW AVAILABLE

In response to a very definite demand from our readers and recognizing that Nature Magazine is preserved by many individuals as well as libraries, we have gone forward with the task of compiling an index to the first twenty volumes of Nature Magazine.

This Index is in size the same as the page size of Nature Magazine, and may be bound in with Volume Twenty. It is so complete that it is also about the same thickness as one issue of the magazine.

The Index is complete to the last degree, including references to book reviews, brief notes and all illustrations as well as to the main articles.

The cost of compiling and producing this Index is considerable, but to anyone wishing to refer to back issues it is invaluable.

ORDER YOUR COPY OF THE TEN-YEAR INDEX NOW

Send One Dollar to

EDITOR, NATURE MAGAZINE
1214 16th St., Washington, D. C.

"DON'T TEASE ME!"

"I know what's in that can, it's Ken-L-Ration! Open it! Ah-h, I can smell the fresh meat now—that's what I crave!"

The fresh meat in Ken-L-Ration is dressed in Chappel Bros. own modern, sanitary packing plant from the *healthiest meat animals in the world!*

Open the can and feed—no muss—no bother. Insist on Ken-L-Ration, the U. S. Inspected quality balanced food *sold by quality dealers everywhere.*

Ask us for booklet of "Dog Autobiographies" mailed *free* upon request.

CHAPPEL BROS. INC.
117 Peoples Ave. Rockford, Ill.

KEN-L-RATION
THE DOG FOOD SUPREME

for CONSTANT SONG

ROLLER SEED and EGG BISCUIT **GEISLER'S** U.S. PAT. 235621 & 34210

The Proper Food for Proper Health and Constant Song

25c Bird Book Free for dealer's name.

The scientifically balanced food—with proper Vitamin content and best quality imported German Summer Rape. Put up under strictly hygienic conditions by a world-known Bird Expert with 50 years experience, who imports over 100,000 canaries annually.

Mary E. Curtis, Portland, Ore., writes: "My canary stopped singing a year ago. I tried Geisler's Bird Foods and to my astonishment, he sings beautifully again."

At all Dealers or Direct from us LARGE (1 lb.) Box SEED with Biscuit 35c ppd.

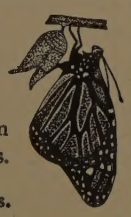
Our Famous LIVING-MUSIC-BOX U. S. Pat. 50853

MOST WONDERFUL SINGING CANARY IN EXISTENCE—different from ordinary singer. *Satisfaction and live arrival guaranteed.* SPECIAL PRICE. $6.95 Reg. $10.00

Max GEISLER BIRD CO. EST. 1888

Dept. E, Omaha, Nebr. Dept. E., 50 Cooper Sq., New York, N.Y.

RAISE AND SELL Monarch butterflies, Cabbage butterflies, June bugs, Squash bugs and other common insects. There is a great demand for the common kinds. Send 3c stamp for details.



LESLIE D. BEADLE, Platteville, Wis.

New Combination
BIRD HOUSE
for Saucy Songsters

A charming home for Wrens, Bluebirds or Chickadees. Scientifically built with adjustable entrance for birds up to 7 inches in length. Weatherproof. All brass fastened. Natural brown finish. Last for years. Order today. $1 Postpaid. 3 for $2. Automatic Feeders $2. Postpaid. No Catalog.

GARDEN COMPANY
Box 56, Stratford, N. J.

FREE MOTHS WITH COCOON ORDERS

On orders of $2. or more, 2 unmounted moths, cecropia and polyphemus, FREE. GUARANTEED living silk cocoons from which *moths will emerge this spring*, comprising our large moths; Polyphemus, Cecropia, and Promethea, assorted: 5 cocoons for $1.00; 10 for $1.75; 15 for $2.25—Luna moth cocoons, 70c each. Automeris 1o cocoons, 35c each. Pupae Cith. regalis, $1.35—P. imperialis, 85c. Colored life history pictures 5 moths, 35c. Wings of 2 moths FREE with orders.

For nature classes, scout groups, schools, etc. Transportation paid. Remit to
C. WM. WURSTER, Suite 1608-BE, 104 Fifth Ave., N.Y.C.

when, with a grateful wag of his stub of a tail, he passed on to the next. The old fox terrier made such a hit with the Garden Club members that before the meeting adjourned that day he was unanimously voted to life membership! —MARY E. RORER

New Plant Species

A new species of plant, now called *Synthyris borealis*, was discovered last summer by Joseph Dixon, Field Naturalist of the Wild Life Studies Division of the National Park Service, in Mount McKinley National Park, Alaska, according to Horace M. Albright, Director of the Service. When Mr. Dixon found it impossible to identify the plant, he sent a specimen to Francis W. Pennell, Curator of the Academy of Natural Sciences of Philadelphia. Mr. Pennell pronounced the plant a new species, and conferred the above name upon it. Mr. Dixon spent the summer in Alaska, continuing studies of plant and animal life started several years ago, and is now engaged in his spare time in identifying and working up the scientific specimens collected. It will be remembered that Mr. Dixon accompanied five expeditions to Alaska, each time searching for the nest of the surf bird. On May 28, 1926, he and George Wright, a member of his party, discovered the first and only nest of this rare bird known to science.

Wolves and Bears

From the September 1932 Bulletin of the Washington Park Zoological Society, written by Edmund Heller, Director of the Zoo at Milwaukee, Wisconsin, we learn of the amicable relations enjoyed by naturally antagonistic species that are reared together. In one of the new barless dens is a happy family consisting of eleven bears—polar, grizzly and black—and four gray wolves. The latter play freely with the bears, especially with the polars. Sometimes a wolf may be seen fast asleep with his head resting comfortably on a pillow formed by the thick coat of snowy white. Occasionally, indeed, a great polar bear will take the head of a wolf into his cavernous mouth, and playfully caress it with his tongue, while the delighted wolf wags his tail like a friendly dog. Sometimes a grizzly bear will lie on his back with his great paws in the air, while a wolf playmate gently bites the chest and belly of his massive companion.

Even more astonishing, perhaps, to those who know the habits of bears in the wild, is the friendly immunity enjoyed by the black bears in the presence of their hereditary enemies, the grizzlies. In the wilderness ranges that they share in common with grizzlies, black bears usually survive only by constant vigilance, and often are driven to save themselves by their ability to climb trees, a power denied the more massive grizzly. Yet here, where more or less close companionship has characterized nearly the entire life of these natural enemies, they exist in amity, even when their food, once each day, is thrown into the great den where they all live together.

New Booklet

Interesting both as an indication of the versatility of the Graflex camera and as a picture story of the United States, is the attractive booklet brought out by the Folmer Graflex Corporation under the title *See America with Graflex.*

DODSON BIRD HOUSES

THE FINEST HOMES *for* YOUR BIRDS

Wren House $1.00 *This genuine Dodson Redwood Bird House, perfectly ventilated delivered for $1.00. Send 10c for catalog, illustrating complete line of Dodson Houses.*

Attract the cheery song birds to your premises. Joseph H. Dodson will help you. His Houses, Shelters, Feeding Stations, and Baths are the result of a lifetime of bird study. Dodson Houses are distinguished by their beauty and sturdiness . . . they offer welcome shelter year after year to the desirable birds.

JOSEPH H. DODSON, INC.
156 Harrison St., "Bird Lodge," Kankakee, Ill.

BISHOP RUSTIC BIRD-HOUSES

No. 31 Wren $1.40

Scientifically designed and subjected to the most rigid field tests. Their natural appearance makes them extremely successful in attracting birds. There are Bishop Houses for Bluebirds, Wrens, Martins, Robins, Chickadees, etc., and Bishop Feeders in a wide variety of styles. All orders postpaid. Illustrated Catalogue ten cents.

No. 35 Wren 85c

Welles L. Bishop, Meriden, Conn.

3 FOR $2.75 Regular Price $3.70

Rustic Cedar Net Imitation Board — Robin — Feeder — Wren or Blue Bird (*specify which*)

SEND NO MONEY Let us send you **parcel post prepaid** 3 Rustic Cedar Bird Houses as illustrated. Designed by leading naturalists to attract song birds. Pay Postman $2.75 plus small m. o. fee on delivery. **Money-back guarantee.** Complete catalog Famous Lincraft Garden Furniture, 16c. New Jersey Fence Co., 203 Logan Ave., Burlington, N. J.

LINCOLN LOG

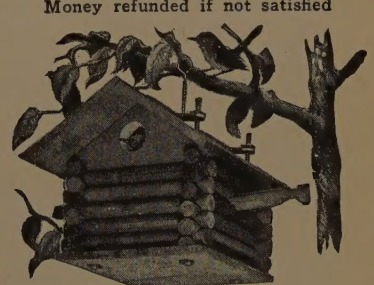
BIRD SHELTER $1.00 Postpaid

Made and colored according to U. S. Government specifications

Shipped "knocked down". Easily assembled—no nails.

Ask your dealer or mail coupon

Money refunded if not satisfied



BIRDHOUSE $1.00 Postpaid

LINCOLN LOGS-1443R-Merchandise Mart Chicago, Illinois-U. S. A.

$.....Enclosed. Please mail me

Postage Prepaid BIRD Shelters..... Houses.....

NAME .....

ADDRESS.....

CLASSIFIED

BINOCULARS—FIELD GLASSES

BINOCULARS, FIELD GLASSES, TELESCOPES—Slightly used, $1.75 up; 8x prism Binoculars, $11.00. All makes, DuMaurier, Busch, Lemaire, Colmont, Megaphos, etc., 3 to 24 power. World's largest assortment. Catalog free. DuMaurier Importers, Dept. 84A, Elmira, N. Y.

BIRD BOOKS

An Educational Game for Home or School

Our Bird Friends. Illustrations and text accurate. Indorsed by leading Educators, Ornithologists and Scout Leaders. A Birthday or Holiday Gift of permanent value. Price 50 cents.

Sarah H. Dudley **Berlin, Massachusetts**

COCOONS

COCOONS: dozen including luna, io, $1.00. Maynard, 1192 Lewiston, Rochester, N. Y.

DOGS

WHITE COLLIE PUPS

the most beautiful specimens the Dog World can offer. Useful and intelligent. Catalogue.

COMRADE FARM KENNELS **Galion, Ohio**

EVERGREENS

RHODODENDRON Max. Kalmia. Hemlock. White Pine and Azaleas, 2–4 ft. 10—$2; 25—$4; 100—$14; Sunny Field Evergreen Co., Doeville, Tenn.

RHODODENDRON, Mt. Laurel, Hemlock, Holly, Azaleas, White Pine, 12 to 24 inches—25 for $2.00; 100 for $6.00. Write for our complete price list today. Pine Hill Evergreen Co., Doeville, Tenn.

FISHING TACKLE

FLY MAKERS' MATERIALS—Complete line of imported feathers, tinsel, gut, hooks, and bulk feathers. Write for new low prices. Shoff Fishing Tackle Company, Dept. N., Kent, Washington.

PHOTOGRAPHIC EQUIPMENT

AKELEY MOTION PICTURE CAMERA. Especially designed by the late Carl Akeley for wild life photography. Takes standard 35 mm. film. Complete with gyroscopic mount, tripod, mounts for telephoto lenses, five film reservoirs holding 200 feet each, and cases for accessories. Cost about $3000. For financial reasons must accept any reasonable offer. Address Box A, Nature Magazine.

PICTURES, POSTCARDS, PHOTOS

ACTUAL WILD LIFE photographs, elk, deer, moose, etc. Set of 12, all different, size 2½x4¼—50c postpaid. Easton Picture Shop, Gardiner, Montana.

SEEDS

TREES, SHRUBS, EVERGREENS. All Ornamentals from Seed. Grow your Own. Catalog and Cultural Directions Free. F. M. Ellis, Dept. N, Griffin, Ga.

STRAWBERRIES

WHY GROW SMALL STRAWBERRIES? Grow Wisconsin Ambrosia—the new, giant variety with leaves 23 by 11 inches. Only 28 to 32 of bright red, firm, and fine texture berries per quart, "field-run." 2 plants with proper care will produce 150 plants by fall. Price—2 plants for 25c (no stamps); 10, $1.00—Postpaid. Lang's Nursery, Platteville, Wis.

R. E. RESORTS

CANADIAN LANDS—Seized and Sold for Taxes: $40 buys 10 acres on traveled road; $67 buys 25 acres hunting and fishing; $58 buys 5 acres lake front; $166 buys 50 acres good farm; $270 buys 300 acres for sheep or game preserve; $324 buys 116 acres ¼ mile ocean front. Our 16th annual list just issued in the form of a 20-page booklet describes the above and many other choice properties offered at Tax Sale prices. The amount quoted is the full price asked, perfect title, no mortgage. Beautifully situated hunting and fishing camps where there is real sport; summer cottage sites; heavily wooded acreages in Muskoka, Highlands of Ontario and the New North; also farms in Ontario, New Brunswick, Quebec, Prairie Provinces and British Columbia. Now is the time to invest in Canada's minerals, forests and farms. Small monthly payments if desired. Don't delay, write today for free booklet with full explanation. TAX SALE SERVICE, Room 615, 72 Queen St., W., Toronto, Canada.

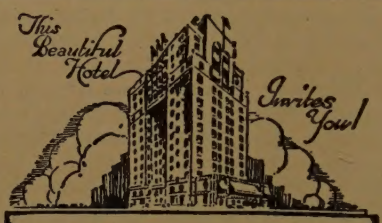
QUEER QUIRKS OF THE MOON

(Continued from page 194)

a clearly-outlined little quadrilateral of stars perched on the back of Hydra. The constellation of Crater, The Cup, also a rider of Hydra, is composed of fainter stars and is less conspicuous. Virgo is a large constellation with a Y-shaped configuration at the base of which is the brilliant Spica. The constellation also extends south of Bootes which is a large kite-shaped constellation with streamers of faint stars extending to either side of Arcturus.

Mars and Jupiter, which have been conspicuous in Leo for many weeks, are still in this constellation. Mars is not far distant from Regulus on the southeast and Jupiter is a few degrees southeast of Mars. The two planets form a striking pair. Jupiter is by far the brighter of the two. Mars is now decreasing in brightness very rapidly. On April 1 it is brighter than any other star visible with the exception of Sirius but by the end of the month it is almost exactly equal to Arcturus in brightness.

Venus will be in superior conjunction with the sun on April 21 and is now too close to the sun for observation. Saturn is in the eastern morning sky and rises about three hours before the sun the middle of April. Mercury is a morning star this month and reaches its greatest elongation west of the sun on April 20. It may be seen around this date in the morning twilight.



Colton Manor

One of Atlantic City's Finest Hotels

Fireproof . . . Sea Water Baths

Marine Sun Deck Overlooking the Ocean

Concert Orchestra

Resident Physician

Rates as low as $5.00 a day.

American Plan.

European Plan if Desired

A. C. ANDREWS, President.

STAMPS

U. S. 100 diff. 90c; 650 diff. stamps, 22 countries $1. Rialto Stamp Co., 111 W. 42nd, New York.

TAXIDERMY

MOUNTED BIRDS . . . ANIMALS . . . GAME HEADS, beautifully mounted. Can be bought for less than mounting charges NOW. Send stamp for list "N". Beverly Taxidermy Studio, 2301 West 91st Street, Chicago, Illinois.

GLASS EYES

TAXIDERMIST SUPPLIES, TOOLS, ETC.
HEAD FORMS AND PANELS

Largest stock of Eyes in the world. Millions to select from. **Catalog FREE**

"SCHOEPFEREYES" 134 West 32nd St., NEW YORK

INDEX TO ADVERTISERS

AQUARIUM

Beldt's Aquarium . . . . . Back Cover
Buskirk's Aquarium 207

BINOCULARS

Loring, J. A. 204

BIRD HOUSES

Bishop, Welles L. 207
Dodson, Joseph H. Inc. 207
Garden Company 207
Lincoln Logs 207
New Nersey Fence Co. 207

BOOKS

Bird-Lore Magazine 154
Gardeners' Chronicle 202
Plymouth Rock Squab Co. 205

EDUCATIONAL

Allegany School of Natural History . . . 201
American Landscape School 206
Pennsylvania State College 206

GARDEN & ACCESSORIES

Acme Sales 201
Ainsley, Gordon 202
Atkins & Durbrow Inc. 197
Burpee, W. Atlee 201
Burpee, W. Atlee Co. 204
Champlain View Gardens 202
Dahliadel Nurseries 203
Davis, W. L. 204
Dreer, Henry A. 203
Gillet, Howard M. 203
Gray & Cole 204
Kelsey Nursery 201
Keene Forestry Nursery 204
Kunderd, A. E. 202
Lax Products Co. 204
Matlack, B. K. 204
New Market Perennial Gardens 202
Peat Import Corporation 199
Quality Gardens 201
Regal Bulb Co. 204
Royal Iris Gardens 202
Schreiner's Iris Garden 204
Shaw, W. B. Aquatic Gardens 203
Three Springs Fisheries 201
Tobacco By-Products Co. 203
Tricker, Wm. Inc. 203
Walsh Tractor Co. 204
Wayside Gardens 201
Western Maine Forest Nursery 203
White, Joseph J. Inc. 202
Wilmaco Gardens 202

HOTELS

Colton Manor Hotel 208
Ludy Hotel 205
Piccadilly Hotel 204

MISCELLANEOUS

Artistic Medal & Badge Co. 206
Beadle, Leslie 207
Cargille, R. P. 205
Comfitape Laboratory 206
Glanz, A. 205
Jig Saw Puzzle 200
Metal Arts Co. 206
Wurster, C. Wm. 207

PETS & THEIR CARE

Chappel Brothers 207
Geisler, Max 207

PHOTOGRAPHIC

Leitz, E. Inc. 157
Pal Ko Camera 157

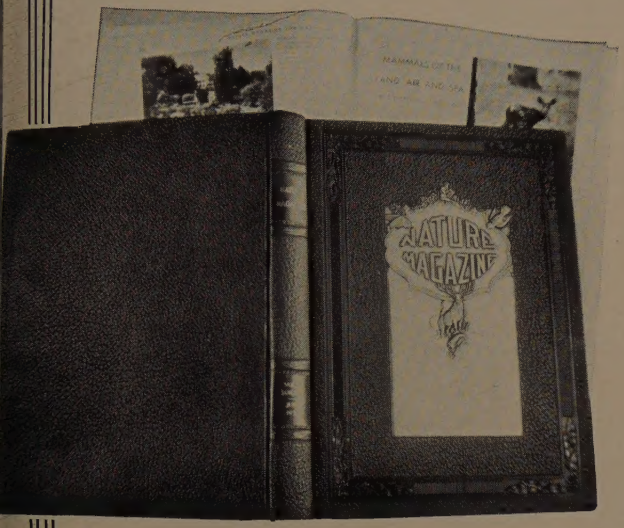
SPORTING GOODS

Canadian Pacific Fishing Camp 157
Hodgson Camp Houses 205
Old Town Canoe 205
Woods Mfg. Co. 205

TRAVEL

American Express 154
Canadian National R.R. 153
Chicago Milwaukee R.R. 155
Great Northern R.R. 154
Northern Pacific 156
Swedish State R.R. 154
Union Pacific R.R. 155

AN ANNOUNCEMENT EXTRAORDINARY!



To Schools, Libraries and to all Subscribing Members in the American Nature Association who have complete files of Nature Magazine or who have a set of Nature Magazine bound volumes.

Volume No. XX Now Available

(Issues of July to December, 1932)

The publication of Volume Number Twenty marks a decade since the publication of the first issue of Nature Magazine in January, 1923. Properly indexed, bound volumes of Nature Magazine make an encyclopedia of information on Nature subjects unobtainable elsewhere at any price. They contain a wealth of fascinating stories about birds, animals, fish, plants, insects, trees, and other phases of Nature and the outdoors.

To mark the tenth anniversary Volume Twenty has been especially bound in an artcraft binding,—a handsome, finely grained, leatherlike cover, embossed in gold—a volume that will do credit to any library or reading table. In addition there is bound into this volume a ten-year index, at no extra cost.

TEN-YEAR INDEX

While each volume of Nature Magazine has been indexed, many readers have asked for a composite index.—It has been compiled and will sell separately at $1.00 per copy. Buyers of Volume Twenty, receive the index in a de luxe binding at the regular price of bound volumes.

Only $3.00

The edition is limited and no additional copies of Volume Twenty will be bound. Send your order accompanied by check today.

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St., N. W.
Washington, D. C.

Enjoy Colorful Water Lilies in Your Pool This Summer

UNEQUALLED IN BEAUTY AND FRAGRANCE AND SO EASY TO CARE FOR

MAY we suggest t
if you have no W
Lily pool, secure on
our portable pools—
are so easy to install
are guaranteed. Ours
sized pool—40 in. lon
in. wide and 12 in. dd
is priced at only $4
Our large portable
is 6 ft. long, 4 ft.
and 18 in. deep an
priced at only $8

Here are three of
most beautiful wa
lilies—each one a g
in its class—rep
duced in natural c
ors: No. 1., Blue S
—each $1.50; No.
Gen. Pershing—$2
each; No. 3., Aug
Koch—$1.50 each.
three — SPECIA
COLLECTIO
PRICE, $4.

ADVICE FRE

Whatever your probl
may be, with Ga
Pools or Living R
Aquariums, our exp
will be glad to help
. . . consult us at
time. Our new, profu
illustrated catalog,
taining many bargain
lections at most rea
able prices, is FR
Send for your copy t

Magnificent Collection of Beautiful Semi-Tropical Colored Fish

No. 1, Cardinal Fish; No. 2, Sailfin. These two pair of fascinating, ornamental fishes are priced at only $1.50 for both pair, live delivery guaranteed. Shipping can, 35 cents extra. To introduce our service to the readers of Nature Magazine, we offer these two pair of fancy fish and a 5½-gallon guaranteed aquarium for the amazing, low price of only..... $4.25

Order direct from this advertisement—
Satisfaction Guaranteed

Remember—write today for our new catalog—it is filled with helpful information. Water Lilies, Aquatic Plants and Ornamental Fishes described and illustrated in full colors. Absolutely FREE, of course.

Water Lilies
Beldt's Aquarium
TROPICAL and GOLD FISH
2141 Crescent Ave. Dept. 5 St. Louis, Mo.

ACTUAL LIFE-SIZE ILLUSTRATION